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OF THE

ENTOMOLOGICAL SOCIETY

OF

WASHINGTON

Volume 69

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SIX NEW SPECIES OF THE CULEX (LOPHOCERAOMYIA) MAMMILIFER GROUP FROM THAILAND

(DIPTERA: CULICIDAE)[1]

RALPH A. BRAM and MANOP RATTANARITHIKUL
South East Asia Mosquito Project, Department of Entomology, Smithsonian Institution, Washington, D. C. 20560[2]

The most recent and complete taxonomic treatment of the *Culex* subgenus *Lophoceraomyia* in any area of South East Asia was that of Colless (1965). This study described 14 new species, revalidated five synonyms, and generally placed the taxonomy of this difficult group on a sound basis for future investigations. The present study describes six new species from Thailand, all of which belong to the *mammilifer* subgroup of the *mammilifer* group as defined by Colless (1965). The *mammilifer* group of the subgenus *Lophoceraomyia* is distinguished from the *fraudatrix* group mainly by the presence of a mammiliform protuberance on the inner surface of the male antennal torus. In the male terminalia, members of the *mammilifer* group exhibit both an internal process and a spinose or toothed dorsal process which compose the lateral plate of the phallosome; members of the *fraudatrix* group possess a toothless dorsal process only. In the larval stage members of the *mammilifer* group have head hairs 4-C distinctly longer than the distance between their bases, in contrast to the *fraudatrix* group in which these hairs are shorter than the distance between their bases. The *mammilifer* subgroup of the *mammilifer* group is recognized by the presence of one lower mesepimeral bristle in the adult, by the larval antenna with hairs 2 and 3 well separated from the apex of the shaft, and by the general container habitats of the larvae; the *brevipalpus* subgroup of the *mammilifer* group lacks a lower mesepimeral bristle in the adult, hairs 2 and 3 of the larval antenna are inserted at the apex of the shaft, and the larval habitat is generally restricted to pitcher plants (*Nepenthes* spp.).

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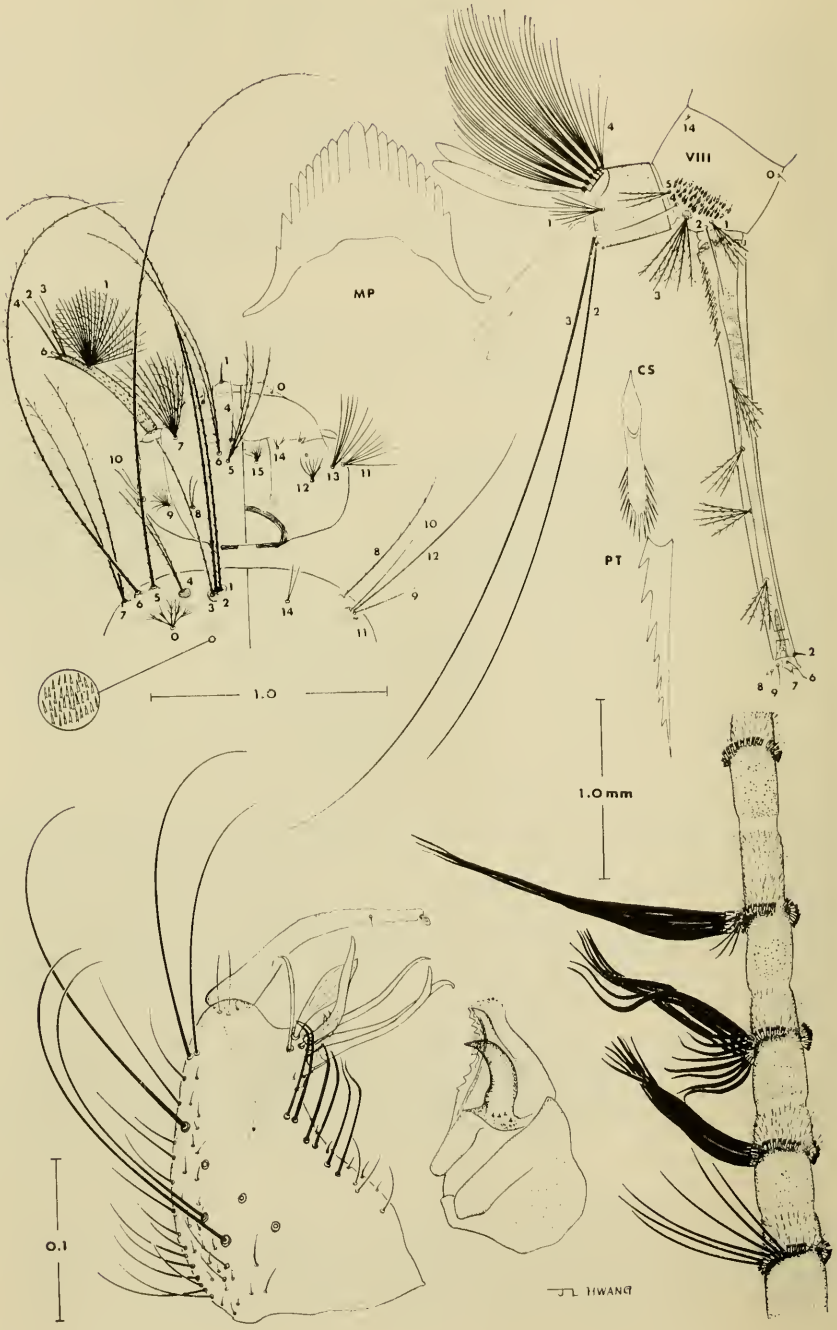
[2] Present address of second author—Public Health Division, USOM, Bangkok, Thailand.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In the following descriptions, terminology of the adult habitus and the immature stages conforms primarily to the format of Belkin (1962); terminology applied to the male antenna and male terminalia follows Colless (1965), except as noted below. Colless referred to the first flagellar division of the male antenna as segment III; in our terminology the first flagellar division is called flagellomere I, recognizing only three true antennal segments (namely, the scape, the pedicel or torus, and the flagellum). Structures of the male terminalia recognized as coxite and style of coxite by Colless are termed basimere and distimere, respectively, in this study. Material utilized in this study is housed in the U. S. National Museum and consists principally of collections made by the Department of Medical Entomology, South East Asia Treaty Organization Medical Research Laboratory, Bangkok, Thailand, and to a lesser extent, the D. C.—E. B. Thurman mosquito collection.

Culex (Lophoceraomyia) spiculosus, species novum

The adult female is very similar to that of *C. traubi* Colless and cannot be separated with certainty. The male is recognized by the absence of conspicuous tufts on antennal flagellomeres V and IX, the submarginal setae of the basimere are arranged in a regular row, and the internal process of the lateral plate of the phallosome does not project beyond the dorsal process. The fourth stage larva is characterized by possessing a long siphon with 4 pairs of strong, long, subventral tufts, having head hair 5-C bifid or trifid, 16, 17-C absent, and having the thoracic and abdominal integument covered with numerous, prominent spicules.

Female. Proboscis dark brown with a pair of prominent basoventral bristles and a pair of smaller setae between them; palpus similar in color to the proboscis; antenna longer than the proboscis; decumbent scales of the vertex narrow and dark, somewhat broader and pale immediately adjacent to the orbital line; erect scales forked, uniformly dark brown. Scutum and midlobe of scutellum sparsely covered with dark scales; pleural integument uniformly pale, tinged with green in fresh specimens; one lower mesepimeral bristle present. Wings normal, outstanding scales narrow, including those on veins R_2 and R_3. Anterior surface of hind femur predominantly pale, with a narrow dark stripe along the dorsal border and a dark band at the apex; hind tibia and tarsus completely dark; mid- and fore-legs uniformly dark scaled, although in some specimens the anterior surface of the mid-femur may exhibit a somewhat paler basoventral area on the anterior surface. Abdominal terga covered with dark brown scales; sterna slightly lighter than the terga.

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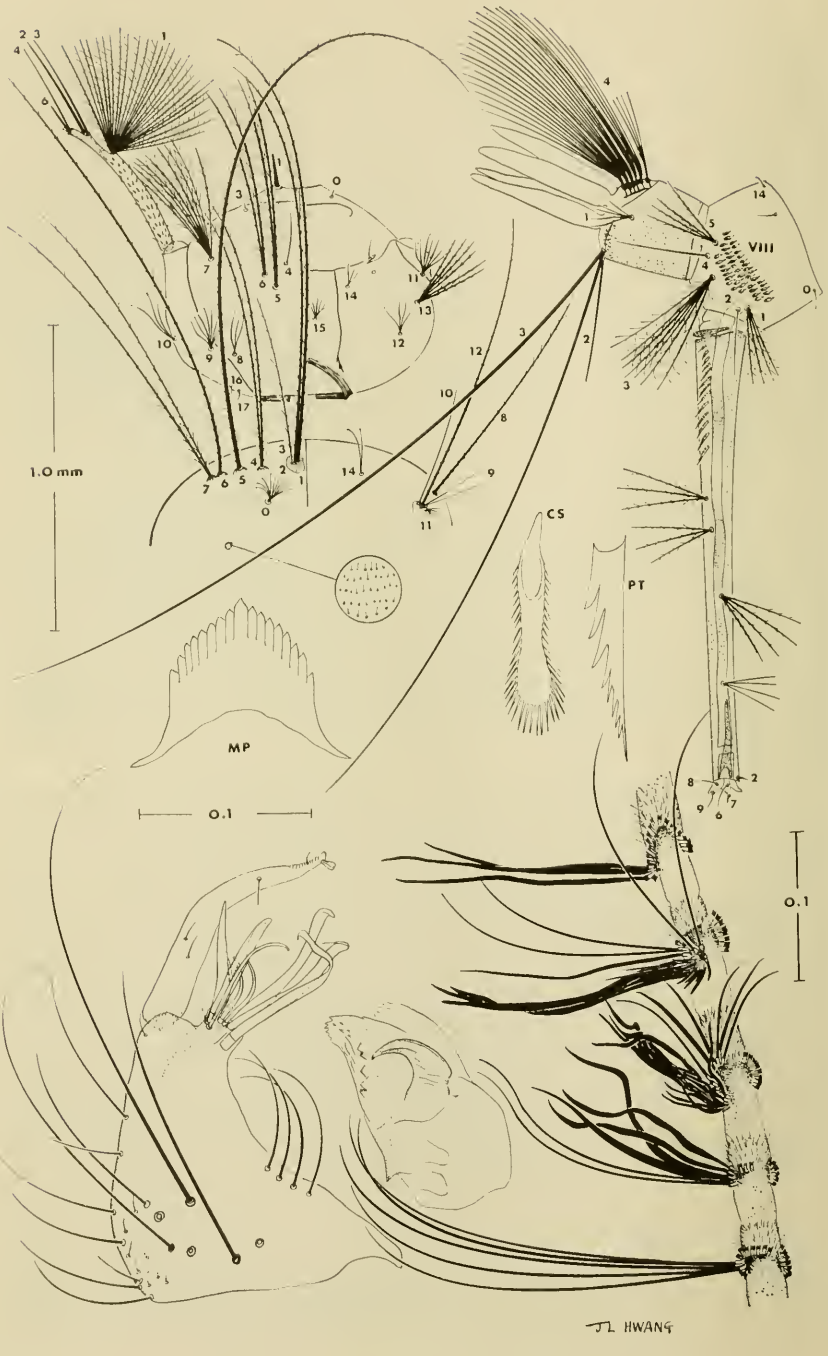
Fig. 1, *Culex* (*Lophoceraomyia*) *spiculosus* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.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Male. Similar in general appearance to the female; length of palpus slightly greater than the length of the proboscis. Flagellomeres V through IX as illustrated in figure 1; flagellomere V with a group of from 6 to 8 very narrow, acute scales whose apices do not reach beyond flagellomere VII; flagellomere VIII with an internal tuft of long and rather straight, broad, dark brown setae; flagellomere IX without a tuft of obviously modified setae. Terminalia as illustrated in figure 1; basimere with from 6 to 8 strong submarginal setae inserted in a straight row; subapical lobe of the basimere with the three rods subequal in length and width, gently curved and pointed apically; internal leaflet rodlike, but broad and bent; external leaflet oblong-ovate, pointed apically and striate; accessory processes narrow, setae-like; distimere normal, the apex without annulations; lateral plate of the phallosome with the internal process distinctly curved and pointed distally, not projecting beyond the apex of the dorsal process; dorsal process with an apical knob and approximately 10 short, but distinct, teeth on the lateral margin.

Larva. Chaetotaxy and structure as illustrated in figure 1. Head lightly pigmented, antenna concolorous with head capsule but with a dark basal ring and progressively darker beyond insertion of antennal hair 1-A; 1-A large, multiple, pectinate, but with the lateral hairlets on only one side of the individual branches. Head hair 1-C darkly pigmented, tapering to a sharp point, its length greater than half the distance between bases of the pair; 4-C single, simple; 5-C with 2 or 3 branches, pectinate, 6-C bifid, subequal in length; 16, 17-C absent. Thoracic and abdominal integument densely spiculose throughout, the spicules of the thorax slightly more prominent than those of the abdomen; thoracic hairs 1, 2-P single, pectinate, subequal in length; 3-P single, pectinate, shorter and slenderer than 1, 2-P; 4-P bifid, pectinate; 5, 6-P single, pectinate; 7-P bifid, pectinate; 8-P single, pectinate; 14-P bifid, simple. Comb consisting of from 35 to 45 fan-shaped scales arranged in a broad, triangular patch. Siphon index variable, ranging from 7:1 to 11:1 (average, 8.8:1); 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts 2 to 5 branched, finely pectinate, their length greater than the width of the siphon at the point of insertion; pecten consisting of from 11 to 14 teeth restricted to approximately the basal fourth of the siphon; individual pecten tooth with a prominent distal spine and approximately 6 to 8 lateral barbs, the proximal 2 or 3 barbs very coarse.

Type Data. Holotype male with associated larval and pupal skins and terminalia and antennae slide mounted from Doi Sam Sao, Tak Province, Thailand, deposited in the U. S. National Museum, No. 69181. Paratypes: 1 male and 2 females with associated larval and pupal skins with the same data as the holotype. The specific name applies to the characteristic thoracic and abdominal spiculation of the fourth stage larva.

Distribution. Known only from the following Provinces in Thailand: Tak, Nakhon Nayok, and Chiang Mai. Eleven individual

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Fig. 2, *Culex* (*Lophoceraomyia*) *peytoni* sp. nov. Dorsoventral view of the fourth stage lava, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

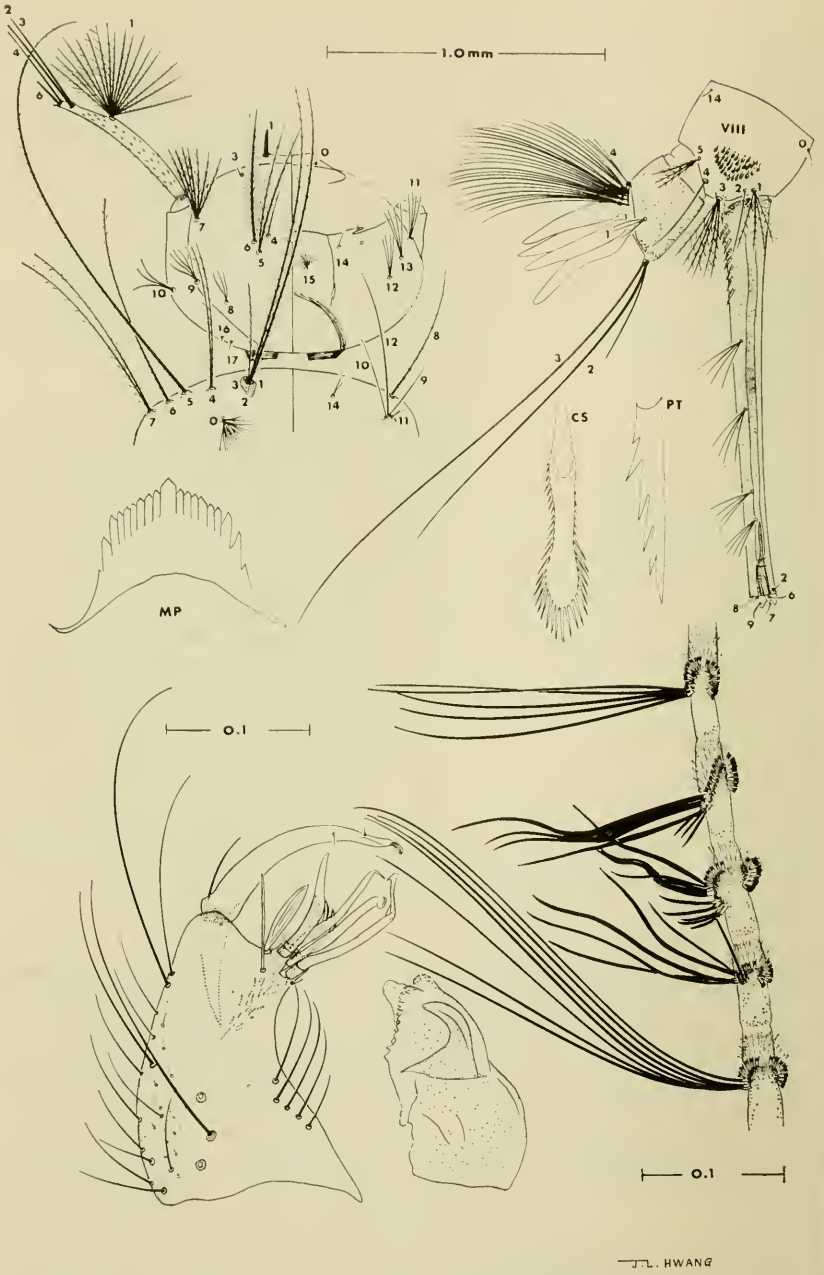


Fig. 3, *Culex* (*Lophoceraomyia*) *eukrines* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

rearings have been examined as well as 6 males, 3 females, and 50 larvae.

Taxonomic Discussion. This species and *peytoni* sp. nov. clearly fall within the sibling species complex of *C. traubi-C. ganapathi* recognized by Colless (1965). Its closest affinity, both in anatomical features and larval biology, is with *traubi* from which it can be separated as follows: in the male terminalia of *spiculosus* sp. nov. the internal process of the phallosome does not project beyond the dorsal process, a condition which does exist in *traubi*; in the larva, hair 2 of the anal segment is single in *spiculosus* sp. nov. as opposed to bifid in *traubi*. Additional distinguishing features may be found in the male antennae.

Biology. Larvae of this species have been collected on 16 occasions from primary rain forests; once from a bamboo stump, once from a bamboo internode, once from a stump hole, and on all other occasions from large tree holes. Collections were made during July, August, and September. Habits of the adults are unknown.

Culex (Lophoceraomyia) peytoni, species novum

The female is indistinguishable from *spiculosus* sp. nov. The adult male may be recognized by the presence of only a few yellowish long hairs on flagellomere V, an internal tuft of at least 5 strongly sigmoid setae on flagellomere VII, a tuft of obviously modified, dark, strong setae on flagellomere IX, and by the internal rod of the subapical lobe of the basimere slightly expanded subapically, followed by a rather broad, gently curved apex. The fourth stage larva possesses a long siphon with 4 pairs of strong, long, subventral tufts; the thoracic integument is covered with fine spicules, but the abdominal integument is mostly smooth and the lateral denticles of the individual pecten teeth are very broad proximally.

Female. No features have been found which differ consistently from the description presented for *spiculosus* sp. nov.

Male. Similar to *spiculosus* sp. nov. except as noted below. Flagellomeres V through IX as illustrated in figure 2; flagellomere V with a group of approximately 6 narrow, setaelike scales which extend to approximately the middle of flagellomere IX; flagellomere VIII with an internal tuft of from 6 to 9 gently curved, dark brown setae; and flagellomere IX with a small internal tuft of 3 strong, rather long, dark setae. Terminalia as illustrated in figure 2; basimere with 4 or 5 strong submarginal setae inserted in a straight row; subapical lobe of the basimere with the internal rod slightly expanded subapically, then bent and with a rather broad, lightly sclerotized apex; the central and external rods subequal in length, sharply hooked apically; accessory processes narrow, but somewhat broader than those found in *spiculosus* sp. nov.; internal leaflet rodlike, gently bent; external leaflet slender, striate; distimere with 1 or 2 additional setae on the proximal third; dorsal process of the lateral plate of the phallosome with a subapical knob and 5 short, but distinct teeth on the lateral margin.

Larva. Chaetotaxy and structure as illustrated in figure 2, similar to *spiculosus* sp. nov. except as noted below. Head hairs 16, 17-C represented by minute spicules which are easily overlooked even in good preparations. Thoracic integument sparsely spiculate, the spicules fine and rather long; abdominal integument

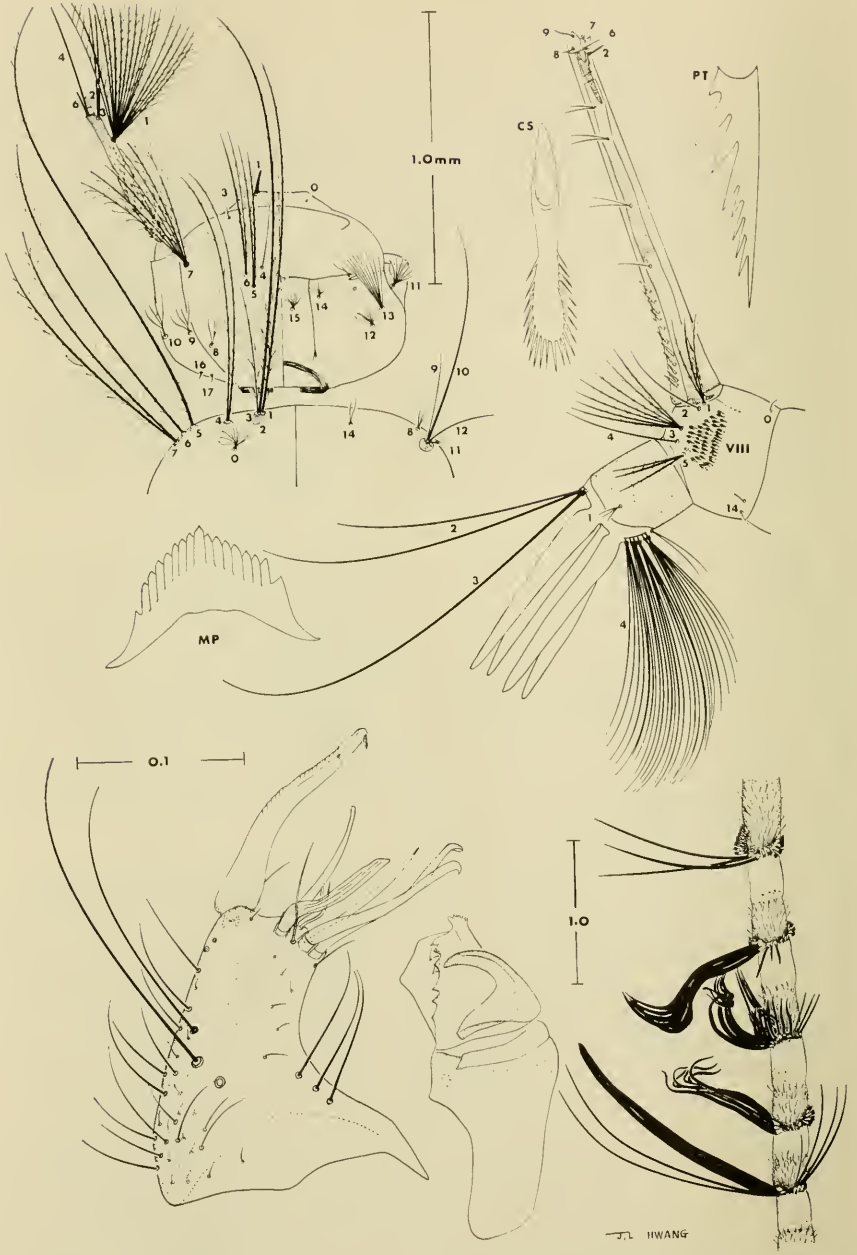


Fig. 4, *Culex* (*Lophoceraomyia*) *pholeter* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

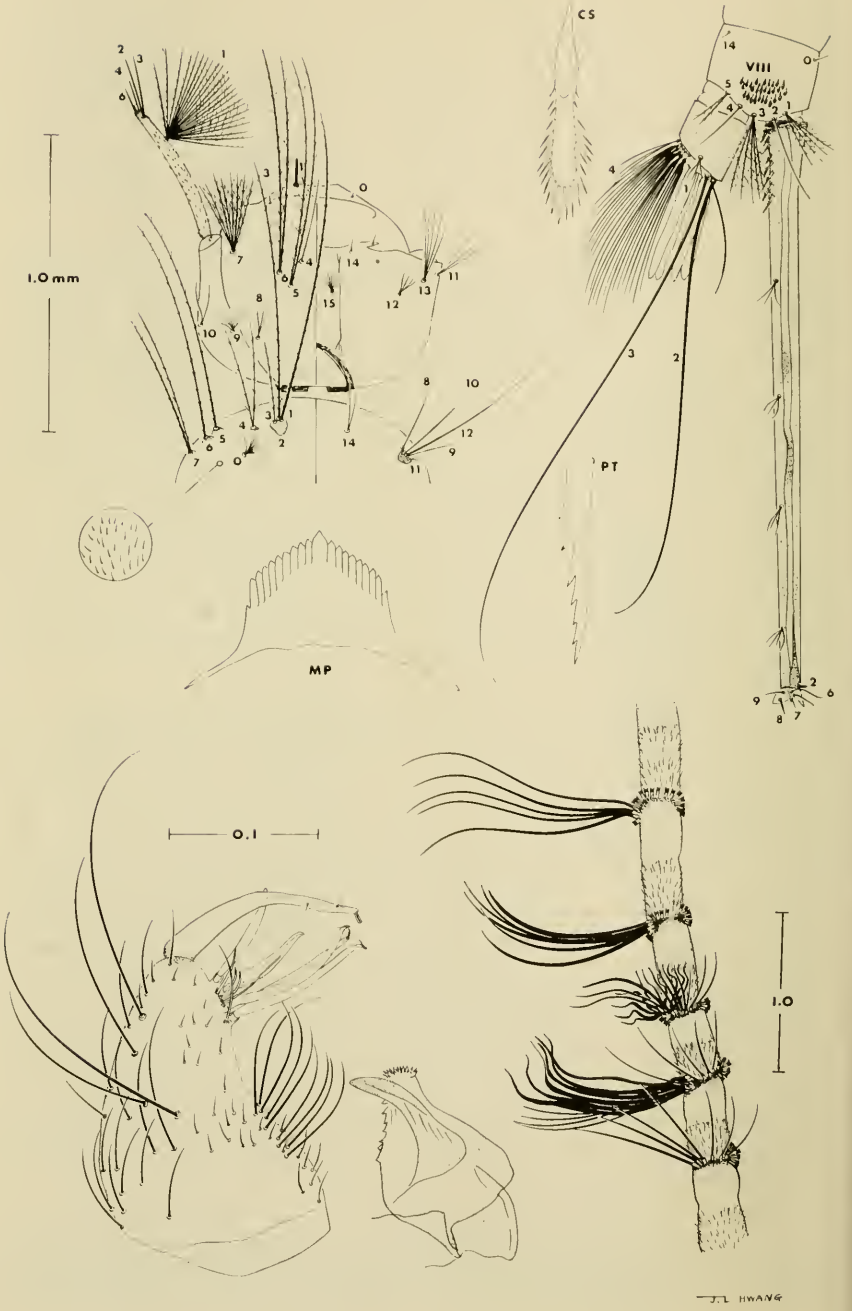
glabrous. Thoracic hair 7-P single or bifid, pectinate. Comb consisting of a broad, triangular patch of from 35 to 50 elongate, fan-shaped scales. Siphon index variable, ranging from 6.6:1 to 9.2:1 (average, 8:1); 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts 3 to 5 branched, their length greater than the width of the siphon at the point of insertion; pecten consisting of from 10 to 14 teeth restricted to the basal fourth of the siphon; individual pecten tooth with an extended, fine distal spine, and from 6 to 10 lateral barbs, the basal barb (sometimes the proximal 2 or 3 barbs) very large and rather rounded apically.

Type Data. Holotype male with associated larval and pupal skins and terminalia and antenna slide mounted from Phatthalung Province, Thailand, 34 kms. on Phatthalung to Trang Road, 15. X. 1964, K. Mongkolpanya, from tree hole 12 feet above ground, deposited in the U. S. National Museum, No. 69182. Paratypes: 1 male and 1 female with associated larval and pupal skins with the same data as the holotype, and 2 males from Ko Chang Island, Ranong Province, Thailand, 16. IX. 1964, K. Mongkolpanya, from a tree stump hole with associated larval and pupal skins. This species is named in honor of SFC E. L. Peyton of the SEATO Medical Research Laboratory.

Distribution. The authors have seen specimens from the following Provinces in Thailand: Trang, Chiang Mai, Sara Buri, Narathiwat, Phatthalung, Chumphon, Ranong, and Chanthaburi. Sixteen individual rearings have been studied, as well as 4 additional males and 70 larvae.

Taxonomic Discussion. As indicated under *spiculosus* sp. nov., this species falls within the *traubi—ganapathi* sibling species complex. Its anatomical affinity seems closest to *ganapathi*, but larval biology is rather intermediate between the two. The adult females cannot be distinguished from the three other members of the complex. The male may be separated from *ganapathi* primarily by the presence of a tuft of modified setae on flagellomere IX as well as the presence of 1 or 2 setae on the proximal third of the distimere; the male differs from *traubi* and *spiculosus* sp. nov. by the presence of a tuft of long, narrow, tapering scales on flagellomere V whose apices reach to approximately the middle of flagellomere IX. The larva may be distinguished from *ganapathi* by the form of the pecten tooth in which the lateral denticles are very broad basally and by the fact that head hair 1-C is never expanded on the basal half as frequently found in *ganapathi*; the larva is distinguished from *traubi* and *spiculosus* sp. nov. by the glabrous abdominal integument and the undeveloped median caudal filament.

Biology. Larvae have been collected on 33 occasions from tree holes, root holes, bamboo internodes, and bamboo stump holes in primary rain forests. One collection was made from a rock hole in dense forest. Habits of the adults are unknown.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Culex (Lophoceraomyia) eukrines, species novum

The adult female is virtually indistinguishable from *spiculosus* sp. nov. and its relatives, but does exhibit slight differences in the scaling patterns on the anterior surface of the hind femur. The adult male exhibits an internal tuft of 3 gently curved setae on flagellomere VII and a tuft of obviously modified, dark, strong setae on flagellomere IX. The larva may be immediately recognized by the head hair 6-C which is always single and stout.

Female. Similar to *spiculosus* sp. nov. except for the following difference. Anterior surface of hind femur completely pale on the proximal half, with a narrow apical dark band which extends proximally along the dorsal border.

Male. Similar to *spiculosus* sp. nov. except as noted below. Flagellomeres V through IX as illustrated in figure 3; flagellomere V with a tuft of 6 very narrow, pale setae extending beyond flagellomere IX; flagellomere VII with an internal tuft of from 3 to 5 gently sigmoid, specialized setae and several shorter, straight setae; flagellomere IX with a tuft of from 3 to 5 long, strong, dark setae. Terminalia as illustrated in figure 3; similar to *peytoni* sp. nov. but with 5 or 6 submarginal setae on the basimere, without setae on the basal third of the distimere, and with approximately 15 teeth on the lateral margin of the dorsal process of the lateral plate of the phallosome.

Larva. Chaetotaxy and structure as illustrated in figure 3, similar to *spiculosus* sp. nov. except as noted below. Head hair 5-C usually bifid, sometimes single, pectinate; 6-C always single, pectinate, somewhat stouter than the individual branches of 5-C; 16, 17-C represented by minute spicules. Thoracic and abdominal integument glabrous; thoracic hairs 5, 6, 7, 8-P single, pectinate, but 7-P occasionally bifid. Comb consisting of from 35 to 50 elongate, fan-shaped scales arranged in a broad triangular patch. Siphon index variable, ranging from 7:1 to 10:1 (average, 8.2:1); 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts with from 2 to 4 branches, their length greater than the width of the siphon at the point of insertion; pecten consisting of from 8 to 12 teeth restricted to the basal third to fourth of the siphon; individual pecten tooth with a prominent distal spine and from 5 to 9 lateral barbs, the proximal 2 or 3 barbs more prominent than the apical barbs.

Type Data. Holotype male with associated larval and pupal skins and terminalia and antenna slide mounted from Huai Bong Ti, Kanchanaburi Province, Thailand, 2. VI. 65, K. Mongkolpanya, from rock pool in bamboo grove, deposited in the U. S. National Museum, No. 69183. Paratypes: 1 male and 2 females with associated larval and pupal skins from Khao no Chang, Kanchanaburi Province, Thailand, 6. VI. 65, E. L. Peyton and K. Mongkolpanya; and 1 male with associated larval and pupal skins from Ban Sai Yok, Kanchanaburi Province, Thailand, 26. V. 1965, S. Chumchulcherm, from a rockhole in a bamboo grove in a mountainous area. The specific name is derived from the Greek adjective meaning clear or distinct.

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Fig. 5, *Culex* (*Lophoceraomyia*) *fuscosiphonis* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

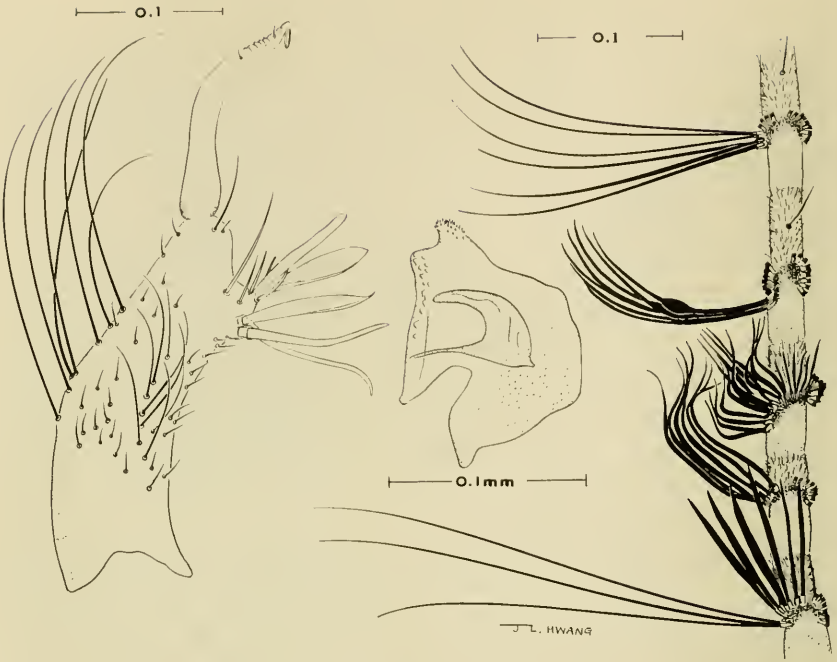

Fig. 6, *Culex* (*Lophoceraomyia*) *incomptus* sp. nov. Dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

Distribution. The authors have examined 24 collections from Kanchanaburi Province, Thailand and one collection each from Nakhon Nayok and Trang Provinces. Fourteen individual rearings were studied, as well as 17 additional males, 21 additional females, and 120 larvae.

Taxonomic Discussion. The adult stage (both male and female) demonstrates affinity to the *traubi—ganapathi* sibling species complex but the larva appears sufficiently distinctive to exclude it from this complex. The female differs from the species previously mentioned only on the basis of the scale patterns of the anterior surface of the hind femur, and this character is frequently difficult to evaluate. The adult male is differentiated from the members of the *traubi—ganapathi* complex by the presence of an internal tuft of approximately 3 gently sigmoid specialized setae on flagellomere VII; it differs from *peytoni* sp. nov. by lacking setae on the basal third of the distimere and by possessing approximately 15 teeth on the dorsal margin of the outer process of the lateral plate of the phallosome; it differs from *spiculosus* sp. nov. on the basis of the internal rod on the subapical lobe of the basimere which is slightly expanded subapically then bent and with a rather broad, lightly sclerotized

apex. The larva is primarily distinguished from the members of the *traubi—ganapathi* complex by the glabrous thoracic and abdominal integument and by the fact that head hair 6-C is always single, rather stout, and apparently somewhat flattened.

Biology. The type habitat of this species was a rock hole located on the face of a cliff in a secondary rain forest which contained about two gallons of water. Larvae of *cukrines* sp. nov. have also been collected from flood pools in a primary rain forest environment, bamboo internodes in a primary rain forest, a coconut shell in a secondary rain forest, a wheel track in a bamboo grove, a teak tree hole, and a pandanus axil in a primary bamboo grove. Most of the collections, however, were made in mountainous areas from bamboo internodes, or rock pools or other container habitats in close association with bamboo groves. Nothing is known of the adult biology.

Culex (Lophoceraomyia) pholeter, species novum

The female is virtually indistinguishable from *spiculosus* sp. nov. The adult male is distinguished by flagellomere V possessing a conspicuous tuft which has from 1 to 4 long, broad scales, by the presence of 3 long, prominent submarginal setae on the basimere, and by the shape of the internal process of the lateral plate of the phallosome. The fourth stage larva exhibits a long siphon with 4 pairs of long, rather fine, usually bifid subventral tufts and thoracic hair 8-P is branched and reduced in size.

Female. The adult female is virtually indistinguishable from *spiculosus* sp. nov., but the abdominal sterna are very pale in contrast to the condition found in *spiculosus* sp. nov.

Male. Similar in general appearance to *spiculosus* sp. nov. except as noted below. Flagellomeres V through IX as illustrated in figure 4; flagellomere V with at least one very broad scale which tapers to a sharp point and extends to flagellomere VIII, as well as several more narrow, but equally long setae-like scales; flagellomere VIII with a tuft of 5 or more strong, broad, dark setae which exhibit a prominent median bend; flagellomere IX with an internal tuft of 3 to 5 long, rather straight, strong setae. Terminalia as illustrated in figure 4; basimere with 3 strong submarginal setae inserted in a straight row; subapical lobe of the basimere with the internal rod tapering to a sharp point and somewhat shorter than the central and external rods which are subequal in length and broadly bent apically; internal leaflet rod-like, fine; external leaflet oblong-ovate, bluntly rounded apically and striated; accessory processes narrow, setae-like; distimere minutely annulate on the apical third of the convex surface; dorsal process of the lateral plate of the phallosome with an apical knob and approximately 7 short, but distinct teeth on the lateral margin.

Larva. Chaetotaxy and structure as illustrated in figure 4, similar to *spiculosus* sp. nov. except as noted below. Head hair 1-C darkly pigmented, tapering to a sharp point, its length less than half the distance between bases of the pair; 16, 17-C represented by small, but distinctive, spicules. Thoracic and abdominal integument glabrous. Thoracic hair 8-P with 2 or 3 branches, simple, very short and fine; 14-P bifid or trifid. Comb consisting of a broad, triangular patch of from 60 to 80 elongate, fan-shaped scales. Siphon index variable, ranging from

6:1 to 7:1; 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts usually bifid (occasionally trifid or single), their length greater than the width of the siphon at the point of insertion; pecten consisting of from 8 to 11 teeth restricted to approximately the basal third to fourth of the siphon; individual pecten tooth with a prominent distal spine and from 7 to 10 lateral barbs, the proximal two barbs very coarse, the distal barbs fine.

Type Data. Holotype male with associated larval and pupal skins and terminalia and antenna slide mounted from Khao Mai Ha Wa, Chon Buri Province, Thailand, 19. VII. 65, E. L. Peyton, from a crab hole in a mountainous secondary rain forest, deposited in the U. S. National Museum, No. 69184. Paratypes: two females with associated larval and pupal skins and one male from the type locality and habitat, 30 VI. 65. The specific name applies to the larval habitat and is taken from the Greek noun meaning one who lurks in a hole.

Distribution. This species is known only from the type locality and from Khao Mai Kaeo, Chon Buri Province, Thailand. Three individual rearings were studied as well as 3 additional males and 4 larvae.

Taxonomic Discussion. The adult male appears to have its closest affinity to *C. mammilifer* (Leicester), due to the presence of the conspicuous tuft on flagellomere V; however, it may be separated from *mammilifer* on the basis of having only 3 prominent submarginal setae on the basimere and the internal process of the lateral plate of the phallosome does not project beyond the apex of the dorsal process. The larva is also similar to that of *mammilifer,* but can be recognized by the presence of 4 pairs of subventral tufts on the siphon; the form of the thoracic hair 8-P is also distinctive, and hair 6 of abdominal segment I is bifid rather than 3 or 4 branched.

Biology. The type habitat of *pholeter* sp. nov. is a small crab hole in a secondary rain forest in a mountainous area. Another collection was made from a crab hole in a tapioca plantation near the type habitat. Collections were made during June, August, and October. Habits of the adults are unknown.

Culex (Lophoceraomyia) fuscosiphonis, species novum

The adult female is indistinguishable from *spiculosus* sp. nov. The adult male is recognized by flagellomere V lacking a conspicuous tuft of long, board scales, by having the prominent submarginal setae inserted in two irregular rows on the basimere, and by the internal process of the lateral plate of the phallosome projecting beyond the apex of the dorsal process. The fourth stage larva exhibits a long, darkly pigmented siphon with 4 pairs of fine, rather short subventral tufts and thoracic hair 8-P single.

Female. Indistinguishable from *spiculosus* sp. nov.

Male. Similar to *spiculosus* sp. nov., except as noted below. Flagellomeres V through IX as illustrated in figure 5; flagellomere V with an internal tuft of about 5 narrow, acute setae whose apices do not reach beyond flagellomere VII; flagellomere IX with a tuft of from 3 to 5 strong, rather long, dark setae.

Terminalia as illustrated in figure 5; basimere with approximately 9 submarginal setae inserted in two parallel but, irregular rows; subapical lobe of the basimere with the internal rod rather broad, constricted at the apex and filamentous beyond the constriction; the central and external rods subequal in length, gently curved apically; lateral plate of the phallosome with the internal process rather narrow, distinctly curved and pointed distally, projecting beyond the apex of the dorsal process; dorsal process with an apical knob and approximately 10 short teeth on the lateral margin.

Larva. Chaetotaxy and structure as illustrated in figure 5, similar to *spiculosus* sp. nov. except as noted below. Head moderately pigmented, antenna slightly darker with a distinctly darker basal ring. Thoracic and abdominal integument covered with a sparse pattern of extremely fine, rather long spicules; thoracic hair 7-P single or bifid, pectinate; 14-P usually bifid, occasionally single, simple. Comb consisting of from 30 to 45 elongate, fan-shaped scales arranged in a broad triangular patch. Siphon index variable, ranging from 10:1 to 12.6:1 (average, 11.8:1); 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts fine, with from 2 to 4 branches, their length equal to, or greater than the width of the siphon at the point of insertion; pecten consisting of from 7 to 10 teeth restricted to approximately the basal fourth or less of the siphon; individual pecten tooth gently curved, with a prominent distal spine and with from 6 to 10 lateral barbs; distal barbs fine, proximal barbs coarse, and conspicuous; siphon and anal segment very darkly pigmented, more so than in any other species examined. The association of the larvae with the male is presumptive: larvae were collected along with a pupa from which the holotype male was reared.

Type Data. Holotype male with terminalia and antennae slide mounted from Muang, Phatthalung Province, Thailand, 15. X. 1964; S. Chumchulcherm, from a tree hole in a primary forest, deposited in the U. S. National Museum, No. 69185. Paratypes: one female with its associated larval and pupal skins from the type locality; one male from Muang, Trang Province, 9. X. 1964, S. Chumchulcherm, reared from a root hole. The specific name is of Latin origin and applies to the exceptionally dark siphon of the fourth stage larva.

Distribution. In addition to the type locality, this species has also been collected in Thailand from Trad and Trang Provinces. The following material was examined in addition to the types: 2♂♂ reared from pupae; 1♀ with associated larval and pupal skins; and 13 larvae.

Taxonomic Discussion. The adult male of this species is extremely similar to *C. demissus* Colless, and on the basis of Colless' description of the unique holotype specimen, the terminalia appear to be inseparable; however, the internal tuft of antennal flagellomere V in *fuscosiphonis* sp. nov. does not exhibit the distinctively long setae which are said to be present in *demissus.* The larva is rather similar to that of *C. wilfredi* Colless but may be distinguished on the basis of the very darkly pigmented siphon and anal segment in *fuscosiphonis* sp. nov. and by hair 2 of the anal segment which is bifid in the case of *fuscosiphonis* sp. nov. and trifid in the case of *wilfredi.*

Biology. The type habitat of this species was a tree hole located in a primary rain forest. Specimens have also been collected from root holes in mountainous primary rain forests and one collection was made from a tree hole in a secondary scrub stand near the sea coast. The biology of the adults is unknown.

Culex (Lophoceraomyia) incomptus, species novum

The adult male may be recognized by the presence of 2 rows of submarginal setae on the basimere, by the 6 acutely pointed scales on flagellomere V, and by the characteristically bulbous setae on flagellomere VIII.

Female. Unknown.

Male. Similar to *fuscosiphonis* sp. nov., except as noted below. Flagellomeres V through IX as illustrated in figure 6; flagellomere V with an internal tuft of approximately 6 acute, striated setae which extend almost to flagellomere VII (these setae are somewhat stronger than those found in *fuscosiphonis* sp. nov.); flagellomere VIII with an internal tuft of 7 strong, dark, gently curved setae, the distal 2 of these setae with a characteristic bulbous, median expansion; flagellomere IX with an internal tuft of 3 short, slender setae and 3 longer, slenderer setae. Terminalia as illustrated in figure 6; basimere with 10 strong, submarginal setae inserted in two irregular rows; subapical lobe of the basimere with the internal rod rather robust, constricted at the extreme apex and pointed, the central and external rods subequal in length, hooked apically; internal leaflet rod-like, quite slender; accessory processes narrow and setae-like; distimere with minute annulations on the apical third of the convex surface; dorsal process of the lateral plate of the phallosome with an apical spiculate knob and 12 or more teeth on the lateral margin; internal process robust, distinctly curved, not projecting beyond the apex of the dorsal process.

Larva. Unknown.

Type Data. Holotype male with terminalia and antennae slide mounted from Doi Sutep, Chiang Mai Province, Thailand, 7. I. 53, D. C. and E. B. Thurman, deposited in the U. S. National Museum, No. 69186. Paratypes: two males with terminalia and antennae slide mounted and with the same data as the holotype, deposited in the U. S. National Museum. The specific name applies to the overall adult habitus and is derived from the Latin adjective meaning unadorned.

Distribution. In addition to the type locality, one specimen was collected resting at Doi Tad Fah, Chiang Mai Province, Thaildan. Four males and their associated terminalia and antennae were studied.

Taxonomic Discussion. This species demonstrates a close affinity to *fuscosiphonis* sp. nov. and *demissus*, but the bulbous expansion of setae on flagellomere VIII and the shape of the processes on the subapical lobe of the basimere clearly separates this species from its close relatives. *C. bandoengensis* Brug, another member of the *mammilifer* group which exhibits the submarginal setae in two rows, is

easily separated on the basis of the shape and number of the subapical lobe of the basimere.

Biology. Virtually nothing is known of the biology of this species. Larvae were collected (and the skins subsequently lost) from a tree hole on Doi Sutep Mountain, and one adult male was collected from a low plant under shady damp jungle on Doi Tad Fah Mountain.

Acknowledgments

The authors are indebted to Dr. Botha de Meillon, SEAMP, Smithsonian Institution and Dr. Alan Stone, Agricultural Research Service, U. S. Department of Agriculture who reviewed the manuscript and offered many suggestions throughout the study. Lt. Colonel J. E. Scanlon, Walter Reed Army Institute of Research initiated the collections which led to these studies while at the South East Asia Treaty Organization Medical Research Laboratory, Bangkok.

Personnel of the Department of Medical Entomology, SEATO Medical Research Laboratory, Bangkok, Thailand collected most of the material and prepared specimens for study. Included among these were: Dr. D. J. Gould, SFC E. L. Peyton, Mr. S. Esah, Mr. S. Maneewangse, Mr. S. Chumchulcherm, Mr. K. Mongkolpanya, Mrs. R. Rattanarithikul, Miss S. Sandhinand, and Miss P. Narawat. Technical assistance at SEAMP, Smithsonian Institution was provided by Miss C. C. Lipscomb who typed the manuscript and Miss J. L. Hwang who prepared the illustrations. Dr. P. F. Mattingly kindly permitted the first author to compare specimens with types in the British Museum (Natural History).

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ANOPHELES (ANOPHELES) TIGERTTI, A NEW SPECIES OF THE AITKENII GROUP FROM THAILAND[1]

JOHN E. SCANLON[2] and E. L. PEYTON[3]

During routine surveys of jungle mosquitoes in Southeastern Thailand a small number of larvae and pupae of the *Anopheles aitkenii* group were found in water aspirated from crab holes along a small freshwater stream. Examination of the immature stages and the reared adults disclosed that this was a new species.

The *aitkenii* group was most recently reviewed by Reid (1965), who listed seven valid species for Malaya and Borneo. According to the infrasubgeneric classification adopted by Reid and Knight (1961) the *aitkenii* species group belongs to the *Anopheles* series of the Angusticorn section of the subgenus *Anopheles*. The species of the *aitkenii* group are very similar in gross adult morphology, the adults being rather small, brownish, and with a somewhat culicine appearance. Identification is based chiefly on the male terminalia and larval and pupal chaetotaxy; the females of the group cannot be separated with certainty. Members of the group are largely restricted to hill forests in Southern and Southeast Asia. The adults are rarely taken in large numbers and their habits are very poorly known. The immature stages are collected more frequently and seem to favor small streams, seepages and springs under forest cover. There is practically nothing known of the biting habits of the females and nothing known of their possible role in the transmission of human or animal malaria.

The most salient group characters outlined by Reid (1965) are as follows: very narrow upright forked occipital scales in the adults; wing scales uniformly brown in color; larva with branched antennal hair not over ½ the length of the antennal shaft; inner clypeal hairs rather far apart at the base for the subgenus *Anopheles*, saddle hair often branched. Reid (1965) also indicated that abdominal seta 5 in the pupa is considerably shorter than the abdominal segments, but the present species differs from other pupae of the *aitkenii* group in this respect.

In the following description and accompanying illustrations the terminology and numbering of the setae are essentially those of Belkin (1962).

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Anopheles (Anopheles) tigertti, sp. n.

(Figs. 1, 2)

Female. A rather small (wing 2.9 mm) delicate species, uniformly brownish in color. No characters have been found which will permit its separation from other members of the *aitkenii* group. *Head.* Proboscis long, thin, uniformly dark, labellum dark brown; palpus similarly colored, slightly shorter than proboscis; antennal flagellomeres brown, without scales, but with well developed whorls of setae; vertex with a small number of forward projecting chetae and thin upright forked scales. *Thorax.* Propleural setae obscured in the single female available; wing with dark scales only, fringe unicolored, anterior fork-cell index 1.25, posterior fork-cell index 0.55; halter knob dark scaled, stem paler; legs without distinct markings, femora somewhat lighter ventrally than dorsally; scutum with well developed achrostichal and dorso-central bristles, a median dark line from the anterior promentory to the pre-scutellar space, single lateral lines on either side of the median line, from the anterior margin of the scutum to the scutellum; scutellar bristles strongly developed; anterior pronotal lobe with eight setae, sternopleuron with three setae, three upper mesepimeral setae. *Abdomen.* Dull olive brown above, slightly paler ventrally, heavily covered with fine setae; no distinctive markings.

Male. Very similar in general appearance to female. *Head.* Proboscis long, thin, dark; palpus with elongated apical knob; antennal flagellomeres lighter in color than in the female, with more strongly developed setal tufts; scales of vertex similar to female. *Terminalia.* General structure as in figure 2. Basimere short, conical, with well developed setae; two basal spines tapered, curved apically; subapical spine curved; distimere evenly curved, with 5–6 short setae near the apex; dorsal lobe of the harpago divided, outer portion with two strong flattened setae, inner portion with a flattened spine having a club-like apex; ventral lobe of the harpago also divided, outer portion with two spines, inner rounded portion with one long seta and numerous smaller setae, tip of the phallosome without leaflets, body of the phallosome with several small spines on dorsal and ventral surfaces and near the apex.

Larva. Chaetotaxy and general appearance as in figure 1. *Head.* Antenna with well developed spicules on basal two-thirds, smaller number on apical third, antennal hair (1–A) dorsal, 5–9 branches; hair 2-C divided into 3–4 branches about ⅔ from the base, bases of hairs 2-C separated by less than the distance between 2-C and 3-C on either side; hair 4-C with 3–4 branches, inserted slightly external to the base of 2-C, hair 3-C divided into 2 branches about ¾ from base. *Thorax.* Hair 1-P with 8–10 branches; 2-P longer, with a more strongly developed basal tubercle. One long hair of each meso- and meta-thoracic pleural group (9–12) 2 branched beyond the middle; metathoracic palmate hair (3-T) well developed, with flattened leaflets and terminal filaments. *Abdomen.* Hair 1-I poorly developed, filamentous hair 1-II with flattened leaflets, but without definite shoulders or terminal filaments; palmate hairs well developed on segments III–VII hair 6-III with 6–12 branches; pecten with 14–18 teeth, fairly uniform in length, but occasionally with 1–2 shorter teeth; hair 1-X with 1–3 branches.

Pupa. Chaetotaxy and general appearance as in figure 2. *Cephalothorax.* Trumpet tubular, with a deep cleft; hair 12-C with numerous branches. *Abdomen.* Hairs 1, 3 and 5 well developed on segments II to VII; hair 5 long on most

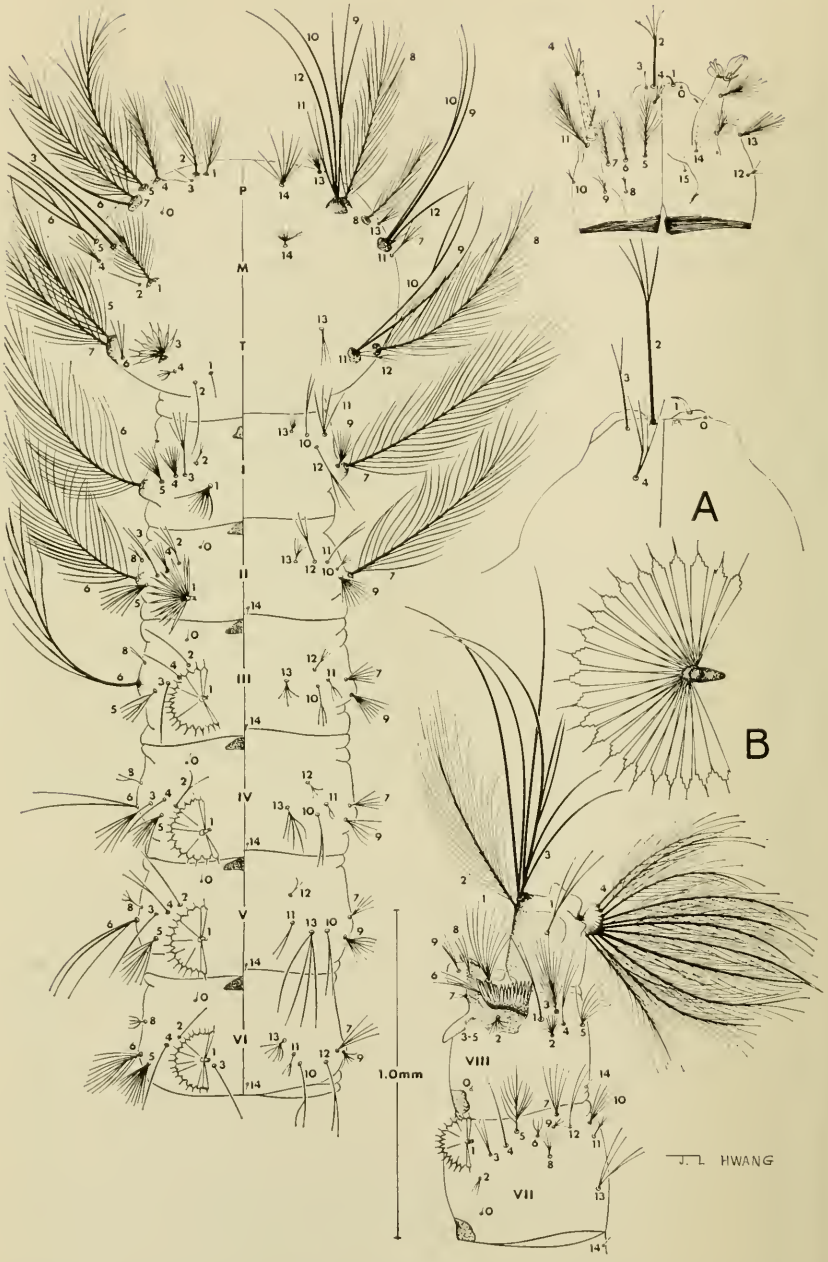

Fig. 1. *Anopheles* (*Anopheles*) *tigertti* sp. nov. Dorsoventral view of the fourth stage larva. A, enlarged view of placement of clypeal setae; B, enlarged view of hair 1-IV.

segments particularly IV and V, reaching or exceeding the posterior margins of the succeeding segments; hair 9 long on segments IV–VIII.

Type Data. Holotype male with associated larval and pupal skins and terminalia slide mounted with the following data; Thailand, Prahinburi Province, Ban Bu Phram, 150 m, 20 January 1966, Peyton and Kol collectors, deposited in the U. S. National Museum, No. 69239. Paratypes: 1 male with associated pupal skin and terminalia, 1 male with associated terminalia, one female and six larvae having the same data as the holotype to be deposited in the British Museum and the U. S. National Museum. The species is named for Colonel William A. Tigertt, Director of the Walter Reed Army Institute of Research who has done much to promote the study of mosquitoes and malaria in Southeast Asia in recent years.

Distribution. In addition to the type locality (14°16′N., 101°53′ E.) the junior author has identified larval specimens from Khao Sai Dao, Chantanburi Province (12°51′N., 102°13′E.). This is a heavily forested mountain near the Cambodian border and approximately 100 miles southeast of the type locality.

Taxonomic Discussion. The *aitkenii* species group forms a well defined and fairly homogeneous entity with the *Anopheles* series. The present species differs from other *aitkenii* group species in the male terminalia; most strikingly in having small spines or denticles on the surface of the phallosome. In *A. insulaeflorum* the phallosome has spicular processes, but these are limited to the sides of the phallosome toward the apex. The external portion of the dorsal lobe of the harpago has two spines, as in *fragilis* and *bengalensis*, rather than three as in *aitkenii*, *insulaeflorum* and *stricklandi*. The larvae of *tigertti* have relatively few branches (6–12) on hair 6-III, and in this respect resemble *insulaeflorum* and *stricklandi* more than they do the other members of the group, in which this hair has 20–50 branches. In both *insulaeflorum* and *stricklandi*, however, the inner clypeal hairs (2-C) are simple and have their bases set very close together, while these hairs are multiple and inserted somewhat apart in *tigertti*. Among other species of the *aitkenii* group: *pinjeurensis* Barraud is known from a single male which has a remarkably elongated phallosome without spicules. *A. acaci* Baisas and *bornsensis* McArthur have larvae with extensive dichotomous branching of hair 2-C. The larvae of *palmatus* have greatly enlarged tergal plates and short frontal hairs (5-7-C).

Biology. The finding of the immature stages in holes bored by land crabs may have been fortuitous in that the larvae might have been stranded in the overflowing and subsequent drying of a nearby stream. However, two factors rule against this—the finding of larvae of *tigertti* in a similar niche some 100 miles to the southeast of the type locality

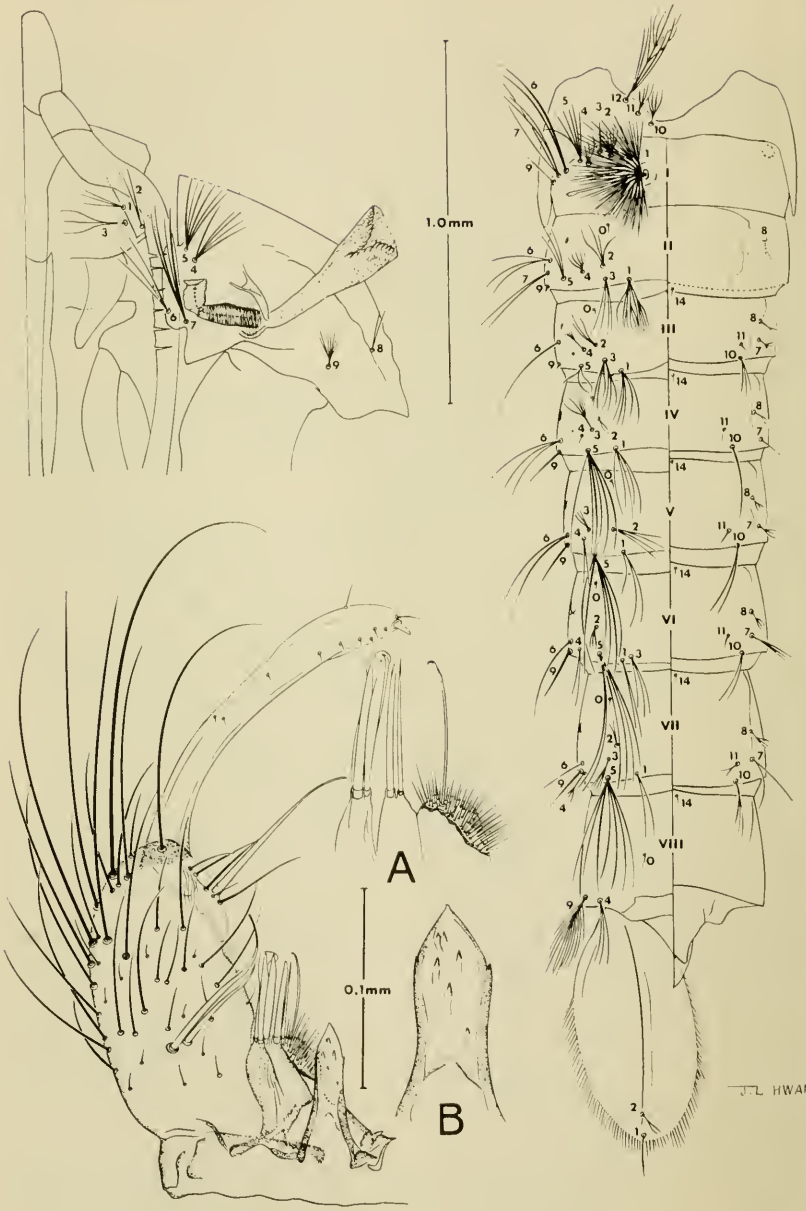

Fig. 2. *Anopheles* (*Anopheles*) *tigertti* sp. nov. Dorsoventral view of pupa and dorsal view of male terminalia. A, apical portion of harpago; B, phallosome.

and the failure to collect larvae from the nearby stream. A significant number of mosquito species are known to inhabit crab holes, including species of the genus *Deinocerites* Theobald 1901 in the New World, and a number of forms in SE Asia, including *Uranotaenia atra* Theobald, 1905 *Aedes* (*Rhinoskusea*) *longirostris* (Leicester) 1908, and several species of *Aedes* (*Cancraedes*) Edwards 1929. Most of these, however, involve marine crabs and littoral areas. Terrestrial crabs are fairly common in the evergreen forests of Southeast Asia and it is possible that further collecting will show their burrows to be a prolific source of mosquitoes.

The adult habits of *tigertti* are entirely unknown since all of the adults examined were reared from immature stages. Adults of the *aitkenii* group are rather rarely collected, usually being found resting in the jungle. There are reports of *aitkenii* group females attacking man (Christophers, 1933; Scanlon and Esah, 1965; Macdonald and Traub, 1960) and Reid (1965) specifically lists *bengalensis* as biting man in Malaya. However, the usual impossibility of distinguishing the females of the group and their relative rarity in inhabited areas in SE Asia makes it difficult to make very definite statements in this regard. There seems to be little reason to believe that species of the *aitkenii* group play any role in the transmission of human malaria. The paucity of human biting records in jungle areas where extensive collections have been made probably indicates that females of the group usually feed on some forest vertebrate other than man.

Acknowledgments

The specimens of *A. tigertti* discussed here were collected by Mr. Somboon Maneechai and Mr. Kol Mongkolpanya, under the direction of the junior author and Dr. Douglas J. Gould, Department of Medical Entomology, U. S. Army Medical Component—SEATO. Specimens were examined by Dr. John Reid, British Museum, and Drs. Alan Stone and Botha de Meillon of the SEAMP. The figures were prepared by Miss Jung Lea Hwang.

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NOTES ON NORTH AMERICAN SALDIDAE
(HEMIPTERA)

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The following notes affected the synonymy of two species of the genus *Saldula* and contain the descriptions of two new species of the genus *Salda,* one of which has long been confused with *Salda littoralis* (L.). I am indebted to R. H. Cobben who first noted one of the new species and one of the errors in synonymy.

Saldula severini Harris 1943

Saldula severini Harris 1943, J. Kans. Ent. Soc. 16(4): 152.

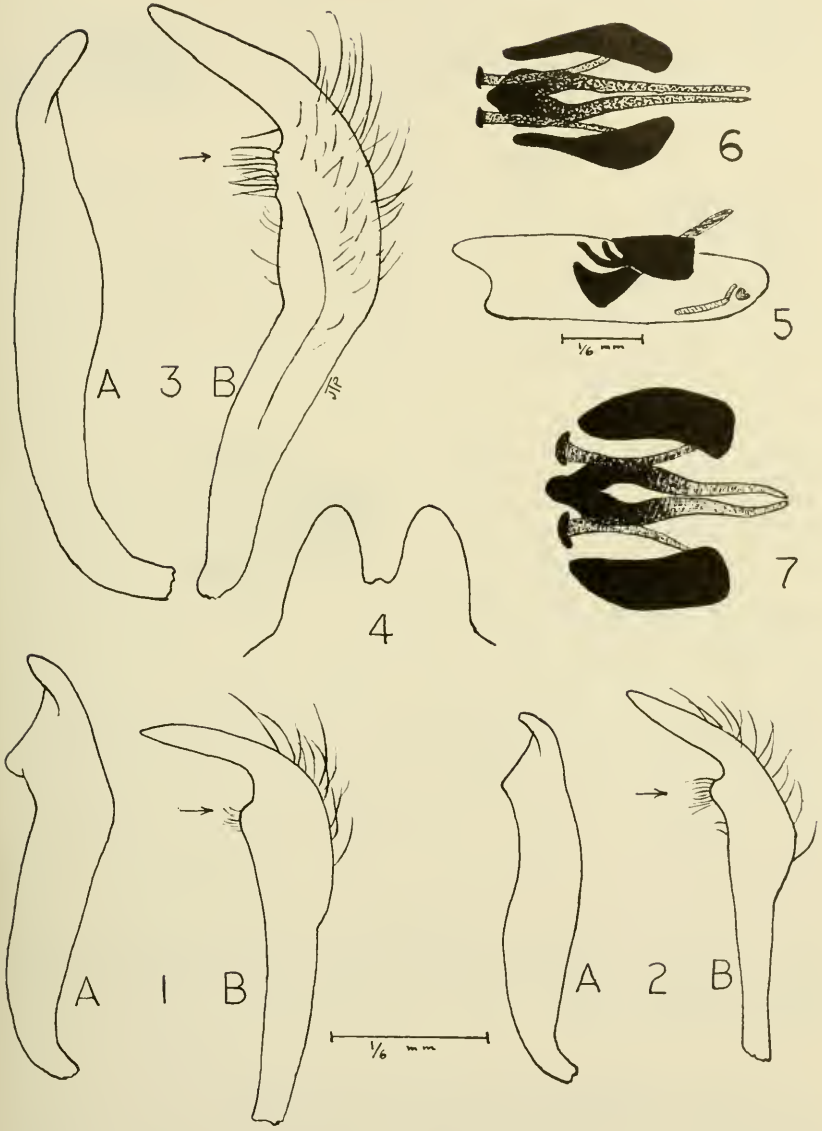
Drake and Hottes (1954) synonymized *Saldula severini* with *S. orbiculata* (Uhler) on the basis of the pronotal margins, which were held to fall within the specific range of variation of the latter species. That this synonymy is wrong was first noticed by R. H. Cobben who suggested that I publish this information. Subsequent investigation by the author has revealed that the male parameres are very unlike, those of *orbiculata* (fig. 1) having a definite mammillate process caudad while *severini* lacks this (fig. 2). Also, *severini* can be separated from *orbiculata* by the length of the hairs of the hind tibia which are subequal to the width of the tibia in the former, and twice or more the width of the tibia in the latter. *Saldula severini* Harris is therefore restored to specific status.

Saldula separata (Uhler) 1878

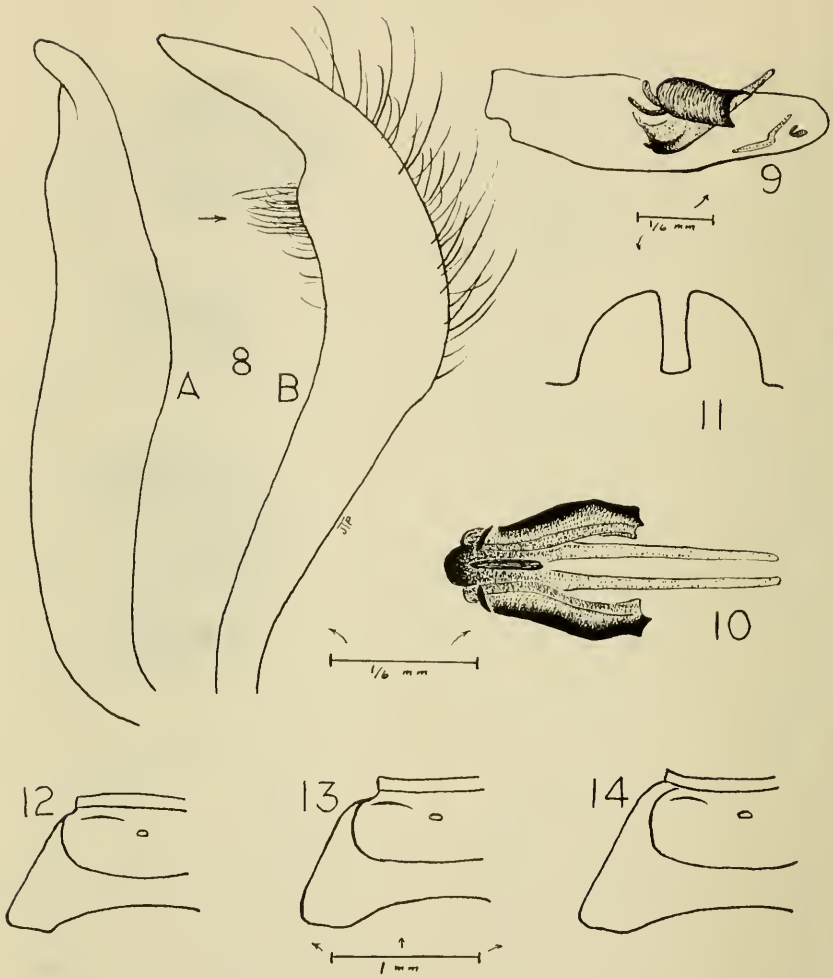
Salda separata Uhler 1878, Proc. Boston Soc. Nat. Hist. 19: 432–433.
Saldula illinoiensis Drake 1949, Ark. for Zool. 42B(3): 2–3 (New Synonymy)

Drake and Hoberlandt in 1951 synonymized *Saldula separata* (Uhler) with *S. pallipes* Fabricius without giving a motivation. Probably they were following the lead of Torre-Bueno (1924) who noted that *Acanthia interstitialis* Say is "known under two further names-*pallipes* Fabricius and *separata* Uhler." Blatchley (1926) considered *separata* a good species and used the long black hairs on the dorsum as a key character.

Uhler's original description mentioned the "erect pubescence" several times, and I have long been convinced that *separata* is conspecific with *Saldula illinoiensis* Drake. A comparison of specimens of the latter species with the type of *separata* shows this to be true; therefore *Saldula separata* Uhler is restored to specific status, and *Saldula illinoiensis* Drake is made a synonym thereof.



Figs. 1–7. 1, Left male paramere of *Saldula orbiculata* Uhler. Two views A & B; 2, Left male paramere of *Saldula severini* Harris. Two views A & B; 3, 4, 5 and 6. *Salda coloradensis* n. sp.; 3, Left male paramere. Two views A & B; 4, Parandria; 5, Penis; 6, Median sclerotized structure of penis; 7, Median sclerotized structure of penis, *Salda buenoi* McDunnough; (Scale for all figures except 5, shown at bottom of Plate)



Figs. 8–14. 8, 9, 10, and 11. *Salda alta* n. sp. 8, Left male paramere; 9, Penis; 10, Median sclerotized structure of penis; 11, Parandria; 12, Pronotum, *Salda coloradensis*, n. sp.; 13, Pronotum, *Salda buenoi*, McDunnough; 14, Pronotum, *Salda alta*, n. sp.

The type of *Saldula separata*, in the Harris collection of the Museum of Comparative Zoology at Harvard, was compared by Dr. P. J. Darlington, Jr. and I am indebted to him for his labors in searching the collections, making the comparison, and furnishing the following information from Harris's notebook. The type bears a number 77(138) and under 77 in the notebook is the following: "Leptopus- Acanthia alternata, S.- Mss? Dr. Green. On salt marsh? May 15, 1837." This

notation matches Uhler's statement that the specimen was labelled with a number 77. Dr. Darlington notes that ". . . . . the type is hardly in first class condition, for it is pinned through the scutellum in such a way as to spread the specimen slightly, and it is somewhat rubbed, so that the pubescence is partly missing. . . . ."

Salda coloradensis, n. sp.

Large, elongate, general color black, macropterous.

Head.—Black, very faintly shining, rugulose; preocellar spot yellowish white; covered with appressed golden pubescence and the usual three pairs of long hairs on frons and vertex, longer pubescence and scattered long hairs on labrum and anteclypeus; vertex slightly carinate between ocelli and eye on each side, the carina produced anteriorly around the front margin of the eyes; ocelli raised slightly, separated by the width of an ocellus; mandibular plates, maxillary plates, anteclypeus and center portion of labrum ochreus; rostrum blackish brown, becoming lighter apically, extending past hind coxae.

Thorax.—Pronotum black, rugulose, covered with thick appressed golden pubescence, feebly shining, narrow; lateral margins straight, narrowed somewhat anteriorly (100:67),[1] almost meeting the collar on a straight line; callus feebly to moderately raised, with small shallow impression in center; posterior lobe shorter than anterior lobe (13:30). Underparts black, covered with fine yellowish white pubescence; acetabulae broadly margined with ochreoleucus. Scutellum as wide (70) as long (68), black, rugose; vestiture as on pronotum.

Wings.—Hemelytra fully developed; vestiture as on pronotum except for the cells of the membrane, the thick pubescence hiding the dorsal surface; black, rugulose and minutely pebbly surface, faintly shining; membrane deep fumose, opaque, minutely pebbly on the surface, with four cells.

Extremities.—Antennal segments 1 and 2 ochreus, segment 1 brown beneath on basal two thirds, segment 2 dark brown on apical tenth, stout; segments 3 and 4 dark brown, as thick or thicker than segment 1; all segments clothed with fine yellowish pubescence, segment 1 with a few black spines and hairs, the other segments with scattered long hairs; antennal proportions: ♂; segment 1, 25; segment 2, 70; segment 3, 50; segment 4, 53. ♀; segment 1, 25; segment 2, 73; segment 3, 48; segment 4, 50.

Legs ochreus; femora with usual browish spots; apex of tibia and second tarsal segment, third tarsal segment brownish black; coxae brownish black, margined basally and apically with ochreus; usual dark spines on tibia.

Genital Structures.—Paramere, parandria, penis and median sclerotized structure of the penis as shown in figures 3, 4, 5 and 6 respectively. Penis filum coiled three and one half times.

Body Measurements.—Holotype (♂), length 5.3 mm., width 2.3 mm.

Allotype (♀), length 5.5 mm., width 2.5 mm.

Mean length of 10♂: 4.95 mm. (max. 5.5; min. 4.6).
Mean width of 10♂: 2.16 mm. (max. 2.5; min. 2.0).
Mean length of 10♂: 5.44 mm. (max. 5.9; min. 5.0).
Mean width of 10♀: 2.42 mm. (max. 2.6; min. 2.2).

[1] For all measurements, 60 units = 1mm.

Material.—Holotype (♂), Sedalia, Colorado VI-29-1961, CL.56, J. T. Polhemus. Allotype (♀), same data as holotype. Paratypes, all collected by J. T. Polhemus, as follows: 1 specimen, Sedalia, Colorado, CL. 56, VI-26-1961; 4 specimens, Sedalia, Colorado, CL. 56, VI-29-1961; 1 specimen, Sedalia, Colorado, CL. 56, VII-1-1961; 30 specimens, Sedalia, Colorado, CL. 56, VII-18-1962; 8 specimens, Granby, Colorado, CL. 55, VI-24-1961; 8 specimens, 1 nymph, Hartsel, Colorado, CL. 120, VI-16-1962; 14 specimens, Hartsel, Colorado, CL. 120, VIII-18-1962; 6 specimens, Silver Plume, Colorado, CL. 44, VIII-6-1961; 1 specimen, Silver Plume, Colorado, CL. 44, VIII-20-1961; 1 specimen, Sargents, Colorado, CL. 208, VIII-3-1963; 2 specimens, Georgetown, Colorado, CL. 44, VII-21-1962; 1 specimen, Georgetown, Colorado, CL. 36, VIII-6-1961; 3 specimens, Saguache, Colorado, CL. 149, VIII-19-1962; 1 specimen, Deckers, Colorado, CL. 178, V-16-1963; 1 specimen, 2 nymphs, Tabernash, Colorado, CL. 129, VI-23-1962.

The holotype, allotype and paratypes are in the collection of the author. Paratypes will be sent to the U. S. National Museum, California Academy of Science and University of Kansas.

Habitat.—*Salda coloradensis* inhabits the damp margins of ponds and damp meadows in the foothills and parks of the Rocky Mountains. It is quite local in both time and place, but is sometimes found in numbers, associating at times with *Salda bouchervillei* Provancher and *Salda buenoi* McDunnough. This species prefers sparse grassy cover, and may range onto almost dry soil. Near Granby, Colorado, specimens were taken in a marsh on granite boulders by pulling away the dense grass cover at the base, thus exposing the saldids resting on the vertical stone surface.

Comparative Notes.—*Salda coloradensis* is most closely allied to *S. littoralis* (L.) and *S. buenoi.* Concerning the latter, *S. buenoi* is usually more robust than *coloradensis,* and has more rounded lateral pronotal margins, especially the antero-lateral angles (Plate I, figures 12 and 13) and darker antenna. However the two are found together at Hartsel, Colorado and are virtually indistinguishable except on the basis of genitalia. The median sclerotized structure of the penis and parameres taken together will serve to separate the adults in difficult situations, as the sclerotized plates of the penis structure are somewhat flattened in *buenoi* (fig. 7) and vertical in *coloradensis* (fig. 6). The paramere of *S. buenoi* has been figured by Drake and Hottes (1951).

The median sclerotized structure of the aedeagus of *Salda littoralis* (L.), figured by Cobben (1957), and *coloradensis* are quite different, and the two probably do not inhabit the same range. *S. littoralis* occurs across northern Europe, Siberia, and into Alaska. Drake and Hottes (1951) record it from Canada and the U. S., however it remains to be determined how far south it has invaded, as many of the existing

records must be discarded as misidentifications, referring instead to *coloradensis*.

Another closely allied species, *Salda nevadensis* Wagner (1960); has been studied. It was found to be very similar to *S. littoralis*, the genitalic structures being virtually the same, and is so far known only from Spain.

Salda coloradensis is the only saldid known to me that is more easily separated from its congeners in the nymphal state than in the adult state. The nymphs are covered with hairs subequal in length to the width of the hind femora, while nymphs of *buenoi* and *littoralis* have only a few insignificant hairs.

R. H. Cobben first noticed that this species is not identical to *Salda littoralis* (L.).

Salda alta, n. sp.

Large, elongate, general color black, macropterous.

Head.—Black, barely shining, rugulose; procellar spot yellowish white; generally covered with short, inconspicuous golden pubescence, longer near eyes, on labrum and anteclypeus; the usual three pairs of long hairs on frons and vertex; vertex depressed between eye and ocelli on each side, the depression produced anteriorly as a carina which continues around anterior margin of eyes; ocelli raised slightly, separated by more than the width of an ocellus; mandibular plates, maxillary plates, center of labrum and lower portion of anteclypeus ochreoleucus; rostrum brown, extending between hind coxae.

Thorax.—Pronotum black, rugulose, covered with short, fine golden pubescence, feebly shining; lateral margins straight, narrowed moderately anteriorly (137:71), anterior angle curved moderately to meet collar (Plate II, fig. 14); callus moderately raised, with shallow impression in center; posterior lobe shorter than anterior lobe (15:35). Underparts black, covered with fine golden pubescence; acetabulae margined with ochreoleucus. Scutellum as wide as long (30:30), black, rugose; vestiture as on pronotum.

Wings.—Hemelytra fully developed, black; with four yellowish spots along outer margin of inner corium, about equally spaced, the first one-fourth of the distance from base to apex, the last next to the membrane; one yellowish spot in center of outer corium, next to inner corium, and a similar spot near the apex of the clavus; vestiture as on pronotum, inner veins of membrane largely free of pubescence; rugulose, faintly shining, except membrane which is relatively smooth and dull; membrane fumose to light sub hyaline smoky brown; darker spot in center of each cell well defined; with four cells.

Extremities.—Antenna brown, dorsal surface of first segment ochreoleucus, long, slender; all segments clothed with brown pubescence, segment 1 with scattered dark spines, remaining segments with scattered long hairs; antennal proportions: ♂; segment 1, 33; segment 2, 80; segment 3, 50; segment 4, 52. ♀; segment 1, 33; segment 2, 83; segment 3, 55; segment 4, 52.

Legs ochreus; femora brown beneath, with usual brown spots; apex of tibia and dorsum of third tarsal segment brown; coxae brown to blackish brown, margined with luteus; usual dark spines on tibia.

Genital Structures.—Paramere, penis, median sclerotized structure of penis and

parandria as shown on Plate II, figures 8, 9, 10 and 11 respectively. Penis filum coiled three and one half times.

Body Measurements.—Holotype (♂), length 6.9 mm., width 3.1 mm.
Allotype (♀), length 7.4 mm., width 3.5 mm.
Paratype (♂), length 6.9 mm., width 3.0 mm.
Mean length of 5♀: 7.47 mm. (max. 7.9; min. 6.9).
Mean width of 5♀: 3.53 mm. (max. 3.7; min. 3.4).

Material.—Holotype (♂) Goose Lake, south of Creede, Colorado, Longitude 107°, Latitude 37°35′, Elevation 11,700 ft., CL. 291, VII-19-1964, J. T. Polhemus. Allotype (♀), and paratypes, one male, four females, three nymphs, same data as holotype. All material is in the collection of the author.

Habitat.—*Salda alta* n. sp. was found on the shore of Goose Lake, which lies in a small depression on a bench at 11,700 ft. in the San Juan Range. The habitat is a typical, wet, high montane meadow with tussocks of grass, black spongy soil, and is ice free only a few months of the year. Only low brush and grass was present in the meadow where *alta* was found, however a good stand of timber was present on the opposite shore of the lake. The location has a southeastern exposure, with a granite wall rising to the west.

Comparative Notes.—*Salda alta* most closely resembles *Salda lugubris* (Say) in the hemelytral markings and size, however the latter species has the lateral pronotal margins rounded, the first cell of the membrane does not project forwardly as far as in *alta,* and the genitalia (see Drake and Hottes 1951) are different. In the type series of *alta* the hemelytral markings vary considerably, being prominent in some specimens and showing additional spots at the middle apex and inner apex of the inner corium, and near the apex of the embolium. The type is the least marked of the series.

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NEW NEOTROPICAL NEOCOELIDIINAE WITH KEYS TO THE SPECIES OF COELIDIANA, XENOCOELIDIA, AND NELIDINA

(HOMOPTERA: CICADELLIDAE)

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As far as known, the long-horned leafhoppers or Neocoelidiinae are unique to the Americas. Recently I published a generic revision of the group (Kramer 1964). In spite of a combination of distinctive features which at once set them apart from all other subfamilies of leafhoppers, Linnavuori (1965: 142) reduced the group to a tribe of the Deltocephalinae on the basis of one character, the bifurcate anterior branches of the tentorium. This proposed change has slight merit in my opinion. It would reduce one of the most distinctive assemblages of leafhoppers to a tribe of the already excessively large and unwieldy Deltocephalinae. My treatment, as a subfamily, agrees with both Evans (1947: 196) and Oman (1949: 59).

Included in this paper are keys to the species of the following genera: *Coelidiana* Oman (four n. spp.), *Xenocoelidia* Kramer (two n. spp.), and *Nelidina* DeLong (one n. sp.). Two new genera, *Chinchinota* (one n. sp.) and *Coelindroma* (two n. spp.), are described. Single new species are described in *Neocoelidia* Gillette & Baker, *Biza* Walker, and *Tozzita* Kramer. Two species names are reduced to synonymy.

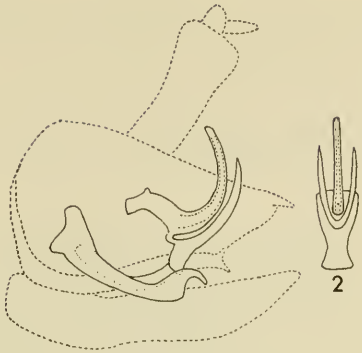
Coelidiana OMAN

For a generic description of *Coelidiana*, see my earlier paper (Kramer 1964: 274–5). The following key includes all known species except those three based on unique female types. The three species in question, *coronata* (Ball), *distinctissima* Linnavuori, and *lurida* Linnavuori, are actually of uncertain generic placement at this time.

KEY TO THE SPECIES OF Coelidiana OMAN

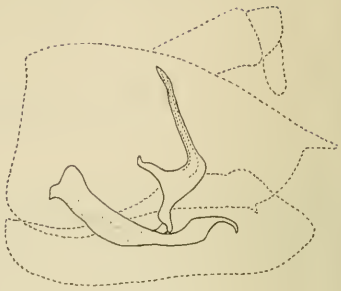
(Males)

1. Aedeagus with one or two long basal processes 2
   Aedeagus with no basal processes 4
2. Aedeagus with a pair of basal processes (fig. 2) ..... **patrator**, n. sp.
   Aedeagus with single basal process 3
3. Pygofer with tooth on ventral margin at apex (Linnavuori & Heller 1961: pl. 2, fig. 2), apex of aedeagus with a moderate sized, posteriorly directed, beak (ibid. pl. 2, fig. 4) ..... **flavida** Linnavuori & Heller
   Pygofer with tooth on ventral margin much basad of apex (Linnavuori 1965: fig. 4a), apex of aedeagus with a tiny anteriorly directed beak (ibid. fig. 3i) ..... **brasiliensis** Linnavuori
4. Pygofer terminating dorsally with a sharp point of moderate length and with a short tooth on ventral margin (fig. 3) 5



PATRATOR
1

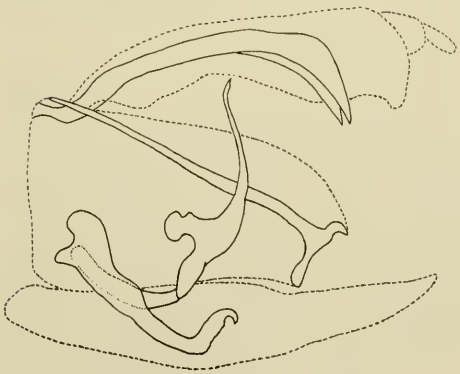
2



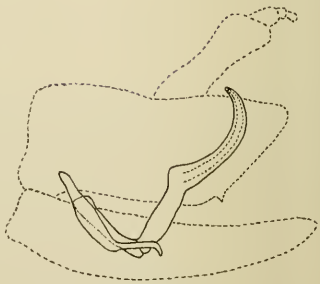
DURATA
3

ANCORA
4

5



COLENS
6



UNDATA
7

Pygofer variable but not as above 7

5. Aedeagal shaft crenulated ventrally (Kramer 1964: fig. 95) ..... **crocata** (Osborn)

Aedeagal shaft smooth ventrally (fig. 3) 6

6. Aedeagal shaft not upturned near base, extreme apex usually bluntly rounded (Kramer 1964: fig. 99) ..... **rubrolineata** (Baker)

Aedeagal shaft abruptly upturned near base, extreme apex not bluntly rounded (fig. 3) ..... **durata**, n. sp.

7. Anal tube with processes 8

Anal tube without processes 11

8. Processes of anal tube long and conspicuous (figs. 4 and 6) 9

Processes of anal tube short and inconspicuous 10

9. Pygofer with a stout decurved process on hind margin, first segment of anal tube about as long as wide (fig. 4) ..... **ancora**, n. sp.

Pygofer without a stout decurved process on hind margin, first segment of anal tube much longer than wide (fig. 6) ..... **colens**, n. sp.

10. Ventral margin of pygofer with two teeth, aedeagus simple (DeLong 1953: pl. 8, fig. 4) ..... **bidentata** DeLong

Ventral margin of pygofer with one tooth, aedeagus with a pair of short triangular processes near apex (Linnavuori 1965: fig. 4e) ..... **signaticeps** Linnavuori

11. Dorsal margin of pygofer terminating with a long slender spine, without a short tooth on ventral margin 12

Dorsal margin of pygofer not terminating with a long slender spine, with a short tooth on ventral margin 13

12. Both dorsal and ventral margins of pygofer terminating with slender spines (DeLong 1953: pl. 8, fig. 7) ..... **bimaculata** (Baker)

Only dorsal margin terminating with a slender spine (DeLong 1953: pl. 8, fig. 8) ..... **spina** DeLong

13. Aedeagus comparatively slender, distal portion of style slender and necklike, plates longer than pygofer (fig. 7) ..... **undata** (Linnavuori)

Aedeagus comparatively stouter, distal portion of style not as above, plates not longer than pygofer 14

14. Aedeagal shaft gradually upturned distally, posterior margin of pygofer truncate (DeLong 1953: pl. 8, fig. 5) ..... **unipuncta** (DeLong)

Aedeagal shaft more abruptly upturned distally, posterior margin of pygofer rounded (DeLong 1953: pl. 8, fig. 6) ..... **anomala** (DeLong)

Coelidiana patrator, n. sp.

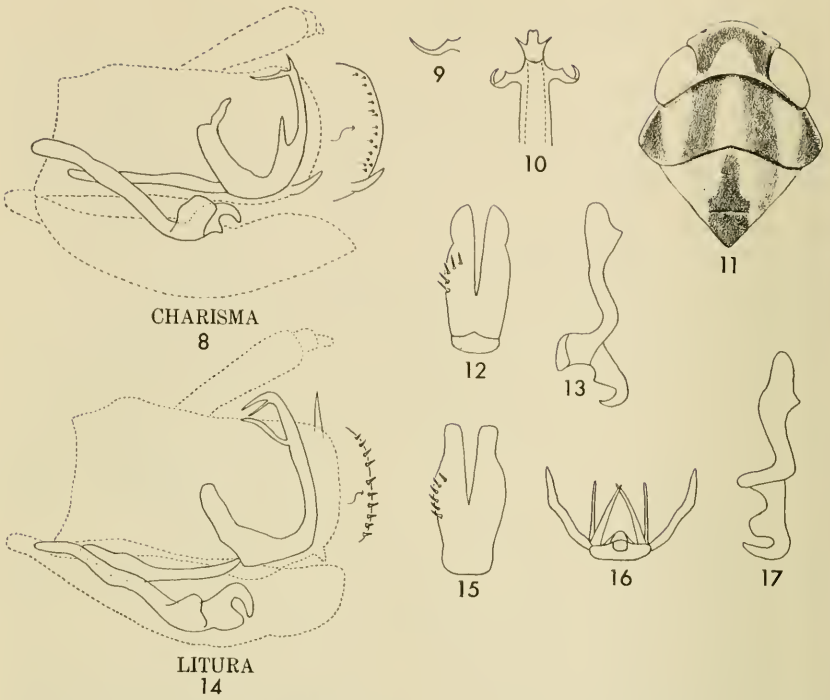
(Figs. 1–2)

Length.—Males 6–6.25 mm.

Structure.—Crown broadly angular at apex; interocular width one and a half times median length.

←

Figs. 1–7. *Coelidiana patrator*, n. sp. Fig. 1, male genital capsule laterally; fig. 2, aedeagus posteriorly. *Coelidiana durata*, n. sp. Fig. 3, male genital capsule laterally. *Coelidiana ancora*, n. sp. Fig. 4, male genital capsule laterally. *Coelidiana colens*, n. sp. Fig. 5, head and thorax dorsally; fig. 6, male genital capsule laterally. *Coelidiana undata* (Linnavuori). Fig. 7, male genital capsule laterally.



Figs. 8–17. *Xenocoelidia charisma*, n. sp. Fig. 8, male genital capsule laterally; fig. 9, subapical process of aedeagus extended in posterior view; fig. 10, aedeagal apex posteriorly; fig. 11, head and thorax dorsally; fig. 12, ventral cover of male genital capsule; fig. 13, right style ventrally. *Xenocoelidia litura*, n. sp. Fig. 14, male genital capsule laterally; fig. 15, ventral cover of male genital capsule; fig. 16, aedeagal apex dorsally; fig. 17, right style ventrolaterally.

Coloration.—Ground color stramineous to yellow; legs and thoracic venter palest; face, crown, pronotum, and scutellum yellow; following portions stramineous to white: a pair of longitudinal oval areas flanking midline on crown from posterior margin to beyond eyes, narrow area on posterior margin of pronotum, a pair of longitudinal oval areas on scutellum flanking midline and narrow short area near base on each lateral margin; forewings pale milky hyaline.

Male genitalia.—Genital capsule laterally (fig. 1) with short acute process at apex of dorsal margin, ventral margin thickened, terminating with a distinct tooth, stylar apex broadly hooked, aedeagus simple and gradually recurved distally with a pair of long simple processes near base, processes seen best in posterior view of aedeagus (fig. 2). Genital capsule ventrally with plates fused except for short distance at apex.

Female genitalia.—Female unknown.

Types.—Holotype male (USNM Type No. 68934) and paratype male, Tingo Maria, Peru, 12 August 1960, O. Vargas.

Notes.—The paired basal processes of the aedeagus set *patrator* apart at once from all other species of *Coelidiana.*

Coelidiana durata, n. sp.

(Fig. 3)

Length.—Males 5.5–6 mm. Female 6 mm.

Structure.—Crown bluntly angular at apex; interocular width slightly more than median length.

Coloration.—Identical to that of *rubrolineata* (Baker), see DeLong 1953: 127.

Male genitalia.—Nearly identical to that of *rubrolineata* (DeLong 1953: pl. 8, fig. 1) except for the style and aedeagus (fig. 3), style with distal portion broadly hooked and flattened dorsally, aedeagus moderately stout basally with shaft narrowed and abruptly upturned.

Female genitalia.—Posterior margin of pregenital sternum nearly truncate with a slight notch at middle.

Types.—Holotype male (USNM Type No. 68935), Abancay, Peru, 13 July 1960, Vargas and Salazar, on *Paspalum*; allotype female and one paratype male with same data except 11 July 1960, S. Vargas, on barley; and one paratype male with same data except 8 July 1960, Young and Salazar, on alfalfa.

Notes.—*C. durata* is very similar to *rubrolineata,* but it can be readily distinguished from it on the basis of the aedeagus as noted in the key to species.

Coelidiana ancora, n. sp.

(Fig. 4)

Length.—Male 6.75 mm.

Structure.—Crown broadly angular at apex; interocular width slightly less than one and a half times median length.

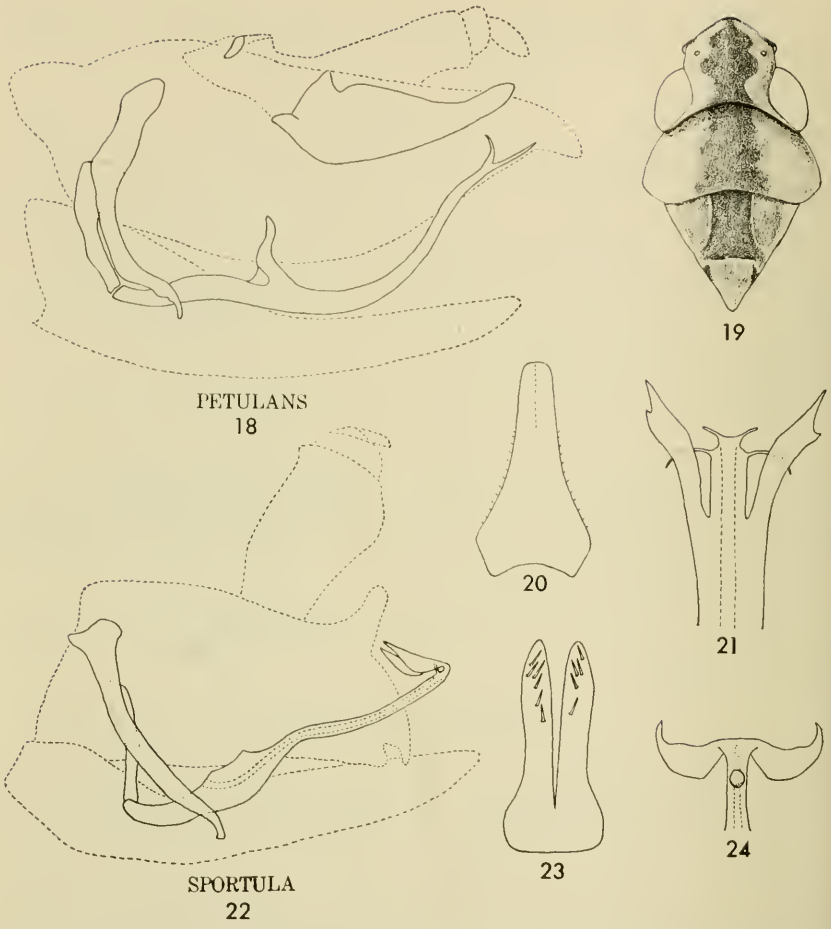
Coloration.—Ground color stramineous to yellow; legs and thoracic venter palest; face and crown stramineous, midline of crown faintly bright yellow; anterior portion of pronotum stramineous with rest bright yellow; scutellum stramineous with apex bright yellow; forewings yellowish hyaline fading to colorless hyaline broadly on costal margins.

Male genitalia.—Genital capsule laterally (fig. 4) with a long, irregular, decurved, stout process on posterior margin; a long distally scaly process from first segment of anal tube (Note: Both of these processes are paired but only one of each is shown in fig. 4); stylar apex strongly hooked; aedeagus stout but simple with shaft decurved and then recurved just before apex; gonopore apical. Genital capsule ventrally with plates fused except for short apical separation.

Female genitalia.—Female unknown.

Type.—Holotype male (USNM Type No. 68936), Huanuco, Peru, Huallaga River Valley, tropical jungle, March 1954, Felix L. Woytkowski.

Notes.—The shapes of the processes of the anal tube and pygofer provide the most obvious unique features of *ancora.*



Figs. 18–24. *Tozzita petulans*, n. sp. Fig. 18, male genital capsule laterally; fig. 19, head and thorax dorsally; fig. 20, ventral cover of male genital capsule; fig. 21, aedeagal apex posteriorly. *Nelidina sportula*, n. sp. Fig. 22, male genital capsule laterally; fig. 23, ventral cover of male genital capsule; fig. 24, aedeagal apex posteriorly.

Coelidiana colens, n. sp.

(Figs. 5–6)

Length.—Males 5.5 mm. Females 6–6.5 mm.

Structure.—Crown (fig. 5) angular at apex; interocular width slightly less than median length.

Coloration.—Somewhat variable, ground color stramineous to bright yellow; venter, including legs and face, usually paler; crown and thoracic dorsum marked with three irregular longitudinal orange to red stripes (fig. 5), the unmarked areas

at times washed with pale green; forewings variable from milky hyaline to yellow hyaline and in females with commissural margins variably orange to red for entire length of clavus.

Male genitalia.—Genital capsule laterally (fig. 6) with a sclerotized band on pygofer from anterior dorsal angle to posterior ventral angle where it broadens along posterior margin; first segment of anal tube with a pair of long processes, processes decurve distally and terminate in sharp points; style distally with a sharp dorsal bend and a small apical hook; aedeagus with shaft gradually narrowed and upturned distally, extreme apex sharply narrowed, gonopore apical. Genital capsule ventrally with plates fused except at apex.

Female genitalia.—Posterior margin of pregenital sternum produced and broadly wedge-shaped.

Types.—Holotype male (USNM Type No. 68937), allotype female, eight paratypes, six males and two females, Iquitos, Peru, 4 August 1960, J. Gonzalez, on pascae; one paratype male (California Academy of Sciences), 67 miles east of Tingo Maria, Yurac, Peru, 11 December 1954, E. L. Schlinger and E. S. Ross.

Notes.—The sclerotized band on the pygofer and the long pair of processes from the anal tube provide the distinguishing features of *colens.*

Xenocoelidia KRAMER

For a generic description of *Xenocoelidia,* see my earlier paper (Kramer 1964: 265). Interestingly enough, females of this genus have not yet been described.

KEY TO THE SPECIES OF **Xenocoelidia** KRAMER
(Males)

1. Crown and pronotum without markings, dorsal ground color ivory white; apex of aedeagus in lateral view with a sharp tooth and a broad acute bladelike dorsal expansion (Kramer 1959: pl. II, fig. 8) (Colombia) ..... **youngi** Kramer
   Either or both crown and pronotum with markings, dorsal ground color not ivory white; aedeagus not as above 2
2. Head marked with two pairs of orange spots, pronotum with a pair of orange-margined black spots near anterior margin; apex of aedeagus in lateral view with a long crooked proximal process and a short slender distal process at apex (Kramer 1964: fig. 42) (Brazil) ..... **inflata** (Osborn)
   Head marked with orange but not as two pairs of spots, pronotum without black markings; aedeagus not as above 3
3. Central portion of pronotum without longitudinal stripes, anterior tibia with longitudinal brown stripe on outer edge; pygofer simple (Kramer 1959: pl. II, fig. 1) (Colombia) ..... **colombiana** Kramer
   Central portion of pronotum with longitudinal stripes, anterior tibia unicolorous; pygofer with a process or projection on dorsal or ventral margins or both 4
4. Dorsal markings vivid; pygofer with process only at apex of ventral margin, aedeagal shaft with long sharp projection in basal half on proximal margin (fig. 8) (Peru) ..... **charisma,** n. sp.

Dorsal markings pale; pygofer with process or projection at apex of both dorsal and ventral margins, aedeagal shaft without a projection in basal half on proximal margin (fig. 14) (Peru) ..... **litura**, n. sp.

Xenocoelidia charisma, n. sp.

(Figs. 8–13)

Length.—Males 6.5–7 mm.

Structure.—Head distinctly narrower than pronotum; crown longer at middle than next to eyes, anterior margin rounded (fig. 11).

Coloration.—Venter, including legs and face, stramineous, at times lightly washed with pale green; antennae and a pair of poorly delimited spots below ocelli orange; ground color of crown, pronotum, and scutellum pale blue-green, marked (fig. 11) with orange-red as an inverted U-shaped band between eyes and as four broad longitudinal stripes on pronotum, scutellum marked mesally with orange-red and on each side with yellow to greenish yellow; forewing with ground color hyaline to somewhat milky, commissural margin fairly broadly and regularly brown to red-brown from scutellar apex to tip of wing, claval vein and area on either side of it variably washed with yellow to greenish yellow.

Male genitalia.—Genital capsule laterally (fig. 8) with a short, slender, simple, and at times upturned, process at apex of ventral margin; hind margin of pygofer often turned in with anteriorly directed setae; style hooked apically with large preapical lobe; aedeagus a modified U-shape with paired processes at apex and single process or projection on proximal margin of shaft. Genital capsule ventrally (fig. 12) with a few setae on middle third. Style ventrally (fig. 13) with typical mesal bend and lateral lobe. Terminus of aedeagus posteriorly (fig. 10) with gonopore near apex.

Female genitalia.—Female unknown.

Types.—Holotype male (USNM Type No. 68938), Tingo Maria, Peru, 12 August 1960, O. Vargas; four paratype males with same data except two each collected by M. Rojas and D. A. Young.

Notes.—The aedeagus of *charisma* is unique in the genus; the coloration is also distinctive and will help to identify this species as noted in the key.

Xenocoelidia litura, n. sp.

(Figs. 14–17)

Length.—Males 6–6.4 mm.

Structure.—Head distinctly narrower than pronotum, crown longer at middle than next to eyes, anterior margin narrowly rounded.

Coloration.—Venter, including legs and face, stramineous; antennal scape orange, rest brownish; ground color of crown, pronotum, and scutellum sordid white to stramineous; crown with a pair of longitudinal oval orange spots, one next to each eye; pronotum and scutellum marked much like those of *charisma* except the longitudinal orange stripes are narrower; forewing with ground color hyaline to somewhat milky, commissural margin marked like that of *charisma* except with orange instead of brown.

Male genitalia.—Genital capsule laterally (fig. 14) with a short toothlike projection at apex of ventral margin and a longer slender upright process at apex

of dorsal margin, hind margin setose, style strongly hooked apically and with a large preapical lobe, aedeagus modified U-shape with gonopore apical and three pairs of anteriorly directed processes (fig. 16) on distal third. Genital capsule ventrally (fig. 15) with a few setae on middle third. Style ventrolaterally (fig. 17) with typical mesal bend.

Female genitalia.—Female unknown.

Types.—Holotype male and one paratype male (without head), Yurac, Peru, 67 miles east of Tingo Maria, 4 October 1954, E. L. Schlinger and E. S. Ross, in collection of California Academy of Sciences, San Francisco, California.

Notes.—*X. litura* looks much like a pale or teneral form of *charisma*, but the many differences in the male genitalia leave no doubt that it is a very distinct species.

Tozzita Kramer

The new species described below belongs in *Tozzita*, but the generic definition (Kramer 1964: 267) will have to be modified to include species with both asymmetrical and symmetrical aedeagi. Couplet 7 in my key to the genera of the genera of the Neocoelidiinae (ibid. 261) will be changed as follows:

7. Style well sclerotized, not wrinkled, and much shorter than aedeagus (fig. 47); aedeagus with apical elaborations (fig. 46) ..... **Tozzita**
Style poorly sclerotized, wrinkled, and as long as aedeagus (fig. 60); aedeagus without apical elaborations (fig. 58) ..... **Xiqilliba**

Note: The figures cited above refer to illustrations which appeared in my 1964 paper.

Tozzita petulans, n. sp.

(Figs. 18–21)

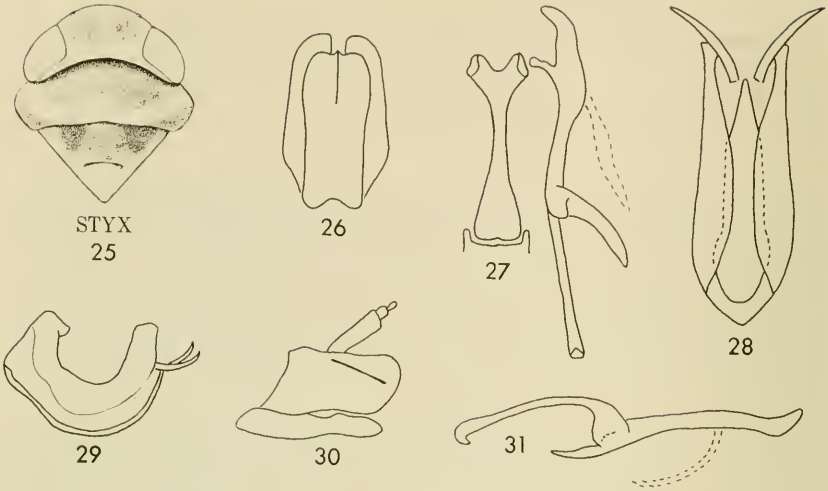
Length.—Males 6.5–6.75 mm.

Structure.—Typical of genus in all respects.

Coloration.—Venter including legs and face stramineous; abdominal segments brownish and only stramineous along posterior margins; at times with faint touches of pink on thoracic and facial sutures, and on scape of antenna; a distinct black spot at middle of extreme upper edge of face just below but touching transverse carina; ground color of crown, pronotum, and scutellum stramineous; sometimes vaguely washed with orange; marked with brown on their midlines and with orange laterally on scutellum as in figure 19; forewing mainly colorless hyaline but with a few touches of pale brown or milky hyaline areas, entire costal vein and area of forewing adjacent to scutellum washed with pink.

Male genitalia.—Genital capsule laterally (fig. 18) with a blunt projection at apex of pygofer, first segment of anal tube flanked by a pair of large rather foot-shaped processes (only one is visible in lateral view), connective short, style weakly hooked apically, symmetrical aedeagus slender and upcurved distally. Genital capsule ventrally (fig. 20) with plates entirely fused but suture visible on slender distal portion. Aedeagal apex posteriorly (fig. 21) with three divisions, lateral divisions acute apically, each with tooth on outer margin, middle division with two pairs of extremely slender appendages and apical gonopore.

Female genitalia.—Female unknown.



Figs. 25–31. *Chinchinota styx*, n. g. and n. sp. Fig. 25, head and thorax dorsally; fig. 26, male genital capsule ventrally; fig. 27, connective and style ventrally; fig. 28, aedeagus posteriorly; fig. 29, aedeagus laterally; fig. 30, male genital capsule laterally; fig. 31, style laterally.

Types.—Holotype male (USNM Type No. 68939) and one paratype male, Rio Caraguata, Matto Grosso, Brazil, March 1953, F. Plaumann.

Notes.—*T. petulans* can be separated at once from *ips* Kramer, the only other species in the genus, by the symmetrical aedeagus. There are many other details of the male genitalia which differ between the species. These details can be understood best by comparing the drawings of *petulans* (figs. 18–21) and *ips* (Kramer 1964: figs. 45–49).

Nelidina DeLong

For a generic description of *Nelidina*, see my earlier paper (Kramer 1964: 272). Females of this genus are, as yet, not known.

Key to the species of **Nelidina** DeLong

(Males)

1. Length 4.5 mm., aedeagal processes ribbonlike and twisted (Kramer 1964: figs. 111–112) (Colombia) ..... **taeniola** Kramer
   Length 7 mm. or more; aedeagal processes neither ribbonlike nor twisted 2
2. Aedeagal processes uniformly slender and about half as long as shaft, aedeagus without a slender tooth at apex (Kramer 1964: fig. 80) (Peru) ..... **defila** (Delong)
   Aedeagal processes broadened, only narrow at base and apex, and much less than half as long as shaft, aedeagus with a slender tooth on dorsal margin near apex (fig. 22) (Peru) ..... **sportula,** n. sp.

Nelidina sportula, n. sp.

(Figs. 22–24)

Length.—Males 7.5 mm.

Structure.—Typical of genus in all respects.

Coloration.—Sordid stramineous to yellow with only markings consisting of embrowning in clavi near scutellar apex and single brown spot at apex of each clavus.

Male genitalia.—Genital capsule laterally (fig. 22) with a broad, moderately long lobe distally on dorsal margin and a preapical notch on ventral margin; apex of style scarcely hooked; aedeagus long, slender, nearly straight, with a pair of subtriangular processes at apex and a small slender tooth dorsally near apex. Gonopore (fig. 24) ventral near apex. Plates (fig. 23) with a few macrosetae distally.

Female genitalia.—Female unknown.

Types.—Holotype male (USNM Type No. 68940) and two paratype males, Callanga, Paucartambo Prov., Dept. Cusco, Peru, 19 February 1952, F. L. Woytkowski.

Notes.—*N. sportula* may be separated from the other members of the genus by the features noted in the key to species.

Chinchinota, n. gen.

Type-species: *Chinchinota styx*, new species.

Without a carina separating face and crown, clypellus expanded distally, clypeus narrow and tapering downward, crown in dorsal view broadly rounded and wider than long, crown smoothly rounded to face, ocelli on extreme upper edge of face and just barely discernable in dorsal aspect, head including eyes narrower than the short pronotum, length of antennae exceeding total length of body and forewings, venation of forewings highly obscure. Male genitalia: valve absent, plates fused, pygofer without processes or prolongations, anal tube simple, connective elongate and Y-shaped, not fused with aedeagus, style long and slender with mesal lobe highly elongated, aedeagus stout and somewhat U-shaped.

Discussion.—This genus will trace to *Chinaia* in couplet 2 of my key to the genera of the Neocoelidiinae (Kramer 1964: 261). *Chinchinota* can be separated from *Chinaia* on the basis of the Y-shaped connective, the exceedingly long slender style, and the lack of elaborations on the distal portion of the pygofer.

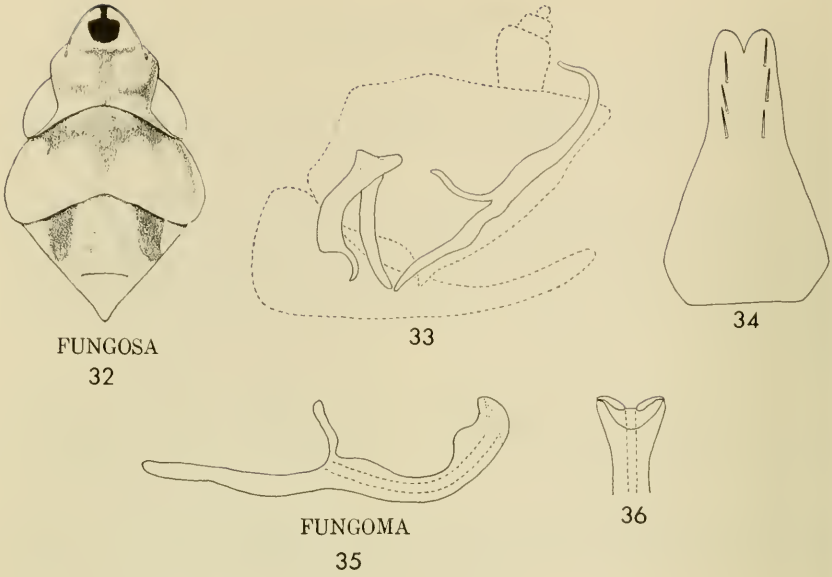
Chinchinota styx, n. sp.

(Figs. 25–31)

Length.—Male 6.5 mm.

Structure.—Suture between clypellus and clypeus absent, antennal ledges oblique, pleural margins of pronotum without carinae.

Coloration.—Legs and venter stramineous, washed variably with brown; ground color of face and antennae stramineous, lateral edges of clypellus and of clypeus, as far upward as antennal ledges, narrowly black to brownish, areas of genae around antennal bases broadly black to brownish, each lateral margin of clypeus from yellow ocellus downward with a broad orange red stripe along inner edge of frontal suture; ground color of crown, pronotum, and scutellum stramineous to sordid



Figs. 32–36. *Coelindroma fungosa*, n. g. and n. sp. Fig. 32, head and thorax dorsally; fig. 33, male genital capsule laterally; fig. 34, ventral cover of male genital capsule. *Coelindroma fungoma*, n. sp. Fig. 35, aedeagus laterally; fig. 36, aedeagal apex posteriorly.

stramineous marked with orange to orange brown as in figure 25; forewing milky hyaline with costal vein, claval suture, and area of clavus along scutellum and commissural margin, orange brown.

Male genitalia.—Genital capsule laterally (fig. 30) with posterior margin of pygofer rounded and produced beyond plates, an oblique pigmented thickening in upper distal portion; genital capsule ventrally (fig. 26) with plates meeting to form a slight projection at middle of posterior margin, suture between plates visible on about distal third; connective ventrally (fig. 27) broadened at juncture with aedeagus and narrowed towards forked base; style ventrally (fig. 27) much longer than connective, with mesal lobe slender and lateral lobe shorter and stouter; style laterally (fig. 31) with mesal lobe hooked at apex and lateral lobe acute at apex; aedeagus laterally (fig. 29) wide with a pair of projecting, moderately long, simple, slender processes on distal margin near apex; aedeagus posteriorly (fig. 28) with processes arising from a membranous or weakly sclerotized area.

Female genitalia.—Female unknown.

Type.—Holotype male (USNM Type No. 68941), Colombia, 1941, L. Richter.

Notes.—Except for the comparatively somber coloration, the habitus of *Chinchinota styx* is much like that of members of the genus *Chinaia*. The male genital structures are much different, however. See discussion under generic description.

Coelindroma, n. gen.

Type-species: *Coelindroma fungosa*, new species.

With a carina separating face and crown; ocelli on anterior margin of crown, one near each end of carina; clypellus parallel-sided; crown in dorsal view produced and bluntly angular apically with median length at least as great as interocular width; head narrower than pronotum; pronotum with posterior margin broadly and sharply indented; antennae over half as long as total length of body and forewings; venation of forewing obscure except apically. Male genitalia: valve absent, plates fused except at apex and with a few macrosetae distally, pygofer without dorsal processes but with a ventral tooth or hook, anal tube simple, connective Y-shaped with arms strongly divergent and not fused with aedeagus, style of moderate length with mesal lobe hooked, aedeagus elongate and not highly elaborated.

Discussion.—This genus will trace to *Neocoelidiana* in couplet 15 of my key to the genera of the Neocoelidiinae (Kramer 1964: 262). *Coelindroma* can be separated from *Neocoelidiana* on the basis of the simple anal tube, the presence of macrosetae on the fused male plates, and the elongated aedeagus.

Coelindroma fungosa, n. sp.

(Figs. 32–34)

Length.—Males 5.5–6 mm.

Structure.—Suture between clypellus and clypeus present, antennal ledges vertical, pleural margins of pronotum carinate.

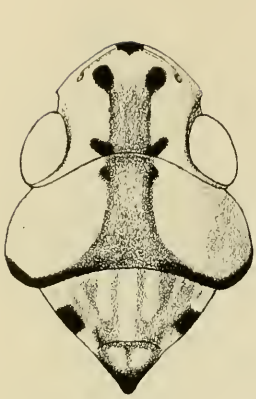
Coloration.—Venter including legs and face stramineous to sordid stramineous, only distinct marking a black spot at middle of extreme upper edge of face just below but usually touching transverse carina; ground color of crown, pronotum, and scutellum pale stramineous to yellow and typically marked as in figure 32; crown with a stalked black spot at apex and two discal, transverse, orange bands joined to a median longitudinal orange band on midline; pronotum marked with orange as an irregular transverse band behind anterior margin, and as irregular longitudinal bands on midline and near each lateral margin, scutellum with a pair of longitudinal orange bands near lateral angles; forewings milky hyaline with faint embrowning at claval apices.

Male genitalia.—Genital capsule laterally (fig. 33), pygofer with a large tooth at apex of short ventral margin, posterior margin oblique, anal tube short, connective and style about equal in length, style with a slender apical hook, aedeagus slender throughout length and recurving near apex, gonopore apical. Genital capsule ventrally (fig. 34) with a few macrosetae on either side distally.

Female genitalia.—Female unknown.

Types.—Holotype male (USNM Type No. 68942), Tingo Maria, Peru, 12 August 1960, D. A. Young; one paratype male with same data except collector O. Vargas; two paratype males (California Academy of Sciences), Tingo Maria, Monson Valley, Peru, one 10 November 1954, the other 2 December 1954, E. L. Schlinger and E. S. Ross.

Notes.—The coronal markings and the aedeagal shape distinguished *Coelindroma fungosa*.



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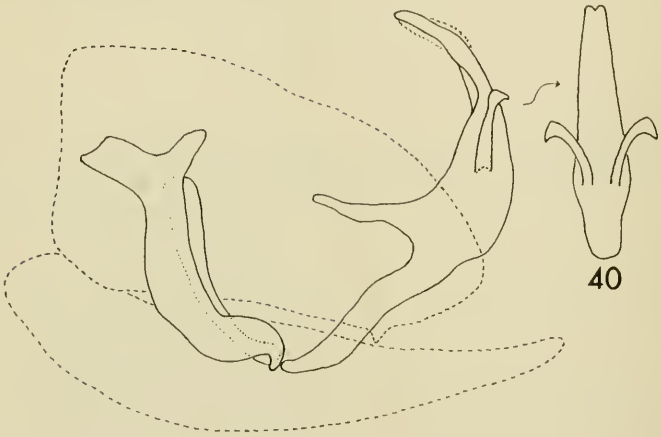

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Figs. 37–40. *Neocoelidia onca*, n. sp. Fig. 37, head and thorax dorsally; fig. 38, male genital capsule laterally. *Biza ava*, n. sp. Fig. 39, male genital capsule laterally; fig. 40, aedeagus posteriorly.

Coelindroma fungoma, n. sp.
(Figs. 35–36)

Length.—Male 5.8 mm.

Structure.—Not different from that of *C. fungosa.*

Coloration.—Like that of *C. fungosa* except as follows: without a black spot at middle of extreme upper edge of face, crown with black spot at apex larger and not stalked, orange coronal markings encompassing most of crown behind anterior margins of eyes and then on each side extending along margin of crown between eye and ocellus to cover antennal ledge, markings of pronotum and scutellum much

less distinct, forewings very narrowly embrowned for entire length along commissual margin.

Male genitalia.—Like that of *C. fungosa* except aedeagus (fig. 35) stouter and with a large preapical bump on dorsal margin.

Female genitalia.—Female unknown.

Type.—Holotype male, Tingo Maria, Monson Valley, Peru, 23 December 1954, E. L. Schlinger and E. S. Ross, in California Academy of Sciences, San Francisco, California.

Notes.—*C. fungoma* is certainly very similar to *fungosa*. The differences in the markings of the head and thorax, as noted above, may or may not prove to be of specific value; but the aedeagus is quite different from that of *fungosa*. There is, of course, the possibility that this is an anomaly; however, it seems best to provide a name until this has been demonstrated.

Neocoelidia onca, n. sp.
(Figs. 37–38)

Length.—Male 5.5 mm.

Structure.—Antennae more than half body length; crown (fig. 37) bluntly angular at apex, interocular width slightly more than median length, a weak carina on anterior margin between ocelli; pronotum faintly transversely rugulose.

Coloration.—Venter, including legs and face, yellow; ground color of crown, pronotum, and scutellum yellow to stramineous with darker markings (fig. 37); crown mesally tan from base anterior to near apex, extreme apex with black spot, a pair of lateral black spots at base and apex of tan area; pronotum mesally brown with poorly defined black spot flanking brown area near anterior margin on each side, humeral angles narrowly black; scutellum discally marked with light brown, a black spot at middle of each lateral margin, extreme apex darkened; forewing pale milky hyaline lightly washed with pale brown, commissural margin broadly brown with inner edge of brown area irregular, claval and costal veins black to brown.

Male genitalia.—The genital capsule laterally (fig. 38) is typical of all members of the genus (see description Kramer 1964: 262–263); aedeagus close to that of *barretti* (Baker) (DeLong 1953: pl. 4, fig. 13) but the dorsal shaft is slightly expanded preapically and the cleft ventral shaft is shorter, stouter basally, with left fork slightly shorter than right one; style distally with both a dorsal and ventral projection.

Female genitalia.—Female unknown.

Type.—Holotype male (USNM Type No. 68943), Ignacio, Misiones, Argentina, May 1961, Krauss.

Notes.—*N. onca* is readily distinguished from all other members of *Neocoelidia* by the distinctive markings on the crown, pronotum, and scutellum. This species provides the southernmost record for the genus in South America.

Biza ava, n. sp.
(Figs. 39–40)

Length.—Male 7.5 mm.

Structure.—Typical of genus in all respects.

Coloration.—Ground color yellow, thoracic venter and legs slightly paler, without markings on head or thorax, forewing yellow on basal two-thirds with a transverse brown band from near claval apex to costal margin, area beyond band pale brown hyaline with veins brown.

Male genitalia.—The genital capsule laterally (fig. 39) with apical portion of pygofer broad and tooth on ventral margin fairly large, stylar apex stout and hooked, aedeagus narrowed and recurved distally with a pair of avicephaliform processes on shaft (fig. 40).

Female genitalia.—Female unknown.

Type.—Holotype male (USNM Type No. 68944), Summit, Panama, Canal Zone, July 1953, Krauss.

Notes.—In my key to the species of *Biza* (Kramer 1962: 103), *ava* will trace to couplet 2. It can be separated from both *crocea* (ibid. fig. 7) and *chinai* (ibid. fig. 3) by the much shorter and uniquely shaped aedeagal processes.

Chinaia Bruner & Metcalf

This genus at the time of its revision (Kramer 1959) included eleven species. Additional material from Panama has shown that *permista* Kramer is merely a color variant of *caprella* Kramer. Hence, *Chinaia permista* is a synonym of *Chinaia caprella* Kramer, **NEW SYNONYMY**. The only species described since the revision is *serrata* Linnavuori (1965: 149) from Matto Grosso, Brazil.

Xiqilliba Kramer

Xiqilliba was described (Kramer 1964: 268) as a monobasic genus with the type-species *bellator* Kramer, a Brazilian species. Linnavuori (1965: 147) described a second species, *coelidoides*, from "Rioja, South America." The two species are identical. Hence, *Xiqilliba coelidoides* Linnavuori is a synonym of *Xiqilliba bellator* Kramer, **NEW SYNONYMY.**

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NEW LOCALITY RECORDS AND A NEW SPECIES OF CHIROTHRIPS HALIDAY

(THYSANOPTERA: THRIPIDAE)

RICHARD ZUR STRASSEN, *Natur-Museum und Forschungs-Institut Senckenberg Frankfurt am Main, Germany*

Chirothrips material from the U. S. National Museum recently studied by the author yielded a new Turkish species and several new locality records. The material listed below is in the U. S. National Museum, except for exchange specimens in the Senckenberg-Museum, Frankfurt am Main, Germany, which is indicated by "SMF."

I am grateful to the authorities of the U. S. National Museum for the loan of the material, and to Kellie O'Neill, U. S. Department of Agriculture, for comparing holotypes and for help in many ways during my studies of *Chirothrips*. In addition, sincere thanks are due the Deutsche Forschungsgemeinschaft, Bad Godesberg, Germany, for continued support of my work on Thysanoptera.

Chirothrips alexanderae Stannard

Chirothrips alexanderae Stannard, 1959. Trans. Illinois State Acad. Sci. 52(1–2): 65–66, fig. 1.

North Dakota: Barnes Co., 2 ♀♀ (1 SMF), from sod by Berlese trap, 30 Oct. 1963, R. L. Post and E. S. Saugstad.

The female holotype and female paratype, from two localities in Colorado, were the only specimens previously known. Stannard doubtfully referred a Nebraska female to this species.

Chirothrips crenulatus Hood

Chirothrips crenulatus Hood, 1927. Jour. New York Ent. Soc. 35: 130–131, pl. 14, fig. 2.

Kansas: Finney Co., Garden City, 2 ♀♀ (1 SMF), on blue grama grass, *Bouteloua gracilis* (H. B. K.) Lag. ex Steud., 21 Sept. 1960.

This species was previously known from Colorado and Nebraska.

Chirothrips falsus Priesner

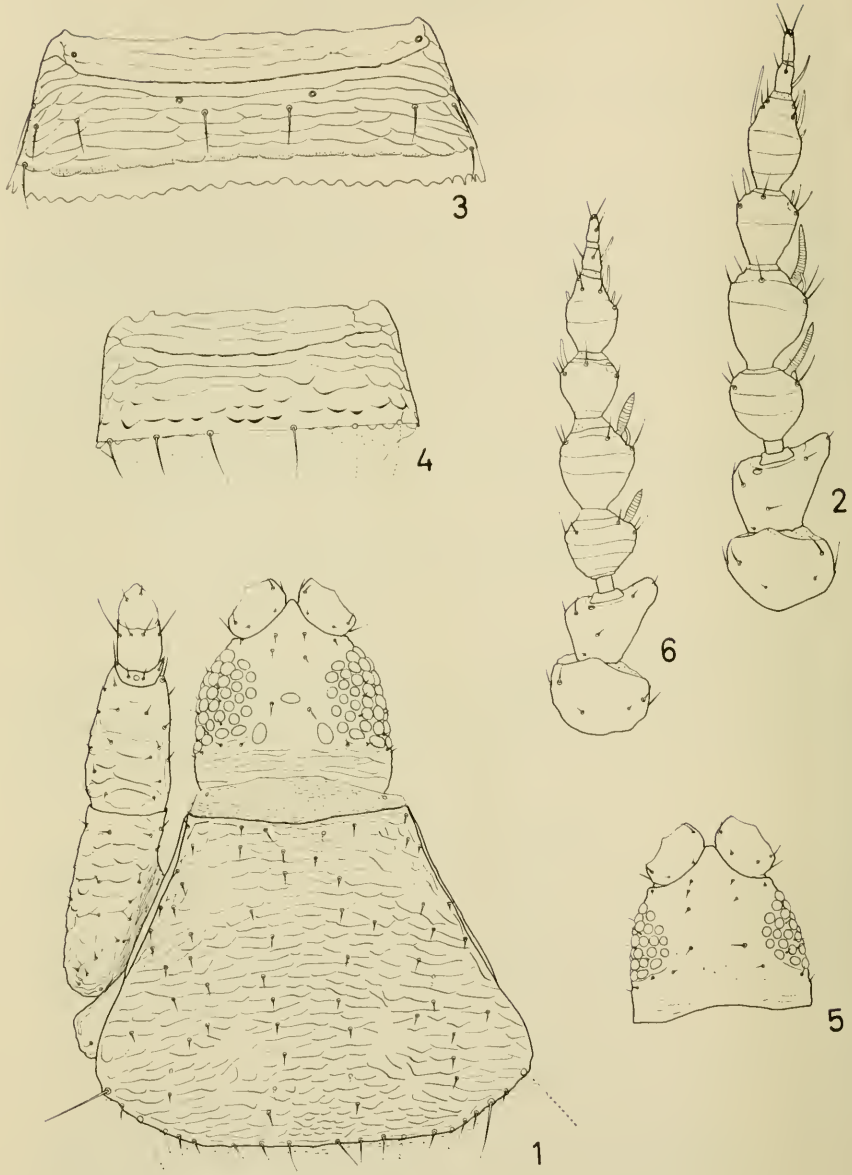
Chirothrips falsus Priesner, 1925. Zool. Jahrb., Abt. 1, 50(3): 312–313.

Arizona: Santa Rita Mtns., 8 ♀♀ on grass, 25 Apr. 1940, Paul Oman.

Kansas: Wellington, 1 ♀ on wheat, April 1909, E. O. G. Kelly.

New Mexico: Santa Fe, 1 ♀ in nest of rodent *Dipodomys spectabilis*, 29 Feb. 1952, H. B. Morlan, lot 52–2931.

Andre (1939) and Hood (1939) synonymized *simplex* Hood with this species, but I (in press) found that they are distinct. At that time



Figs. 1–6. *Chirothrips kurdistanus* n. sp. 1, ♀ head and prothorax, right leg omitted, dorsal view; 2, ♀ (holotype) right antenna, dorsal view; 3, ♀ tergite III; 4, ♀ sternite III; 5, ♂ head, dorsal view; 6, ♂ right antenna, dorsal view.

I recorded *falsus* from Iowa, but all other records of *falsus*, except the original ones from Mexico, must be reviewed for accuracy.

Chirothrips kurdistanus n. sp.

(Figs. 1–6)

Female (macropterous): Body uniformly dark brown; fore tibia somewhat paler in distal two thirds; tarsi yellowish gray or yellowish brown; wings pale brown; antennae dark, segment I dark brown; II brown, paler at outer and distal edges; III yellowish brown; IV–VIII brown.

Head (fig. 1) broader (101–106 μ) than long (90–97 μ), slightly produced (5–7 μ) in front of eyes; sides of production distinctly converging anteriorly. Vertex with 6 ante-ocellar setae, one mesal pair directly behind the other, the setae of each mesal pair 14–21 μ apart. Interocellar setae 13–17 μ long, at or as much as 5 μ posterior to level of anterior ocellus; no setae behind posterior ocelli. Eyes occupying 75–80% of side margins of head. Antennal segments (fig. 2) comparatively short and stout; segment I large, shaped as in *manicatus* group, without dorsal carina; II decidedly produced at outer distal edge; tip of process narrow, rounded, with thin terminal sense hair; maximum diagonal dimension 40–44 μ; sense cones on III and IV simple, long (15–18 and 19–23 μ); V decidedly shorter than IV, its main sense cone at inner edge; VII little shorter than VIII. Total length of antenna, 192–208 μ; lengths (widths) in microns of segments, I, 26–29 (33–36); II, 24–26 (36–37); III (without pedicel), 23–25 (25–26); IV, 31–34 (26–27); V, 24–26 (23–24); VI, 30–33 (18–19); VII, 9–10 (6); VIII, 10–11 (3–4).

Pronotum (fig. 1) 1.3–1.4 times as broad as long; its length 171–192 μ; width across anterior margin 110–127 μ; greatest width 216–242 μ. Surface sculpture short, scalloplike lines, of which 32–38 cross meson; disc with 50–60 small setae, most of them in 4 irregular longitudinal rows. Outer postero-angular setae 31–38 μ, inner ones 24–32 μ long; posteromarginal setae 6–8 pairs. Prosternum without setae. Fore leg normal; tibia not produced at apical edge; femur 102–117 μ long; tibia 71–83 μ.

Pterothorax not particularly heavy, about as long (242–268 μ) as broad (237–262 μ). Mesonotum 84–90 μ long, 145–158 μ broad; all setae about equal, 15–23 μ; surface with usual sculpture; metanotum 61–74 μ long, 113–129 μ broad; metascutellum 36–43 μ long, 96–103 μ broad. Mesosternum faintly sculptured, 96–111 μ long, 206–218 μ broad; metasternum with intercoxal process slender and triangular. Forewing 749–820 μ long; costal margin with 16–22 setae; anterior vein (radius) with 5–6 subbasal and 2 distal setae; posterior vein (media) with 2–3 setae. Hind femur 113–129 μ long, hind tibia 129–142 μ.

Abdomen fairly slender; both surfaces (figs. 3 and 4) distinctly sculptured with long, scalloped or partly anastomosing transverse lines; the heavier subbasal lines of segments IV–VII each with 20–25 minute, regularly spaced notches; tergites I–III and VIII and sternite III with similar but fewer notches. Sternites II–VI each with subapical line of separate, somewhat raised scallops. Tergites I–VII each with distinct posterior marginal plate. Abdominal segments IX and X together 121–134 μ long; greatest width across base of IX 115–132 μ. Lengths of major setae on segment IX, S1 (dorsomesal), 87–96 μ; S2 (submesal), 82–95 μ; S3 (lateral), 117–135 μ, about as long as segments IX and X combined; setae of X,

S1, 121–129 μ; S2, 116–123 μ long. Ovipositor 152–165 μ long, 0.8–0.9 as long as pronotum.

Male (brachypterous): Body much paler than that of female in specimens at hand; prothorax and abdomen grayish brown, anterior abdominal segments paler than posterior ones; pterothorax yellowish brown; antennal segments I and IV–VI brown, II and III pale yellow or yellowish brown, II somewhat paler than III, VII–VIII pale brown; legs grayish brown with outer edges slightly darker.

Head (fig. 5) as in female, 84–89 μ long, 92–96 μ broad; production between eyes and antennae 6–7 μ long; vertex with setae in characteristic position, one mesal pair behind the other. Ocelli wanting. Antenna (fig. 6) with segments shaped as in female, but somewhat stouter; maximum diagonal dimension of II, 39–41 μ. Total length of antenna 163–171 μ; length (width) of segments in microns, I, 26–27 (32–35); II, 23–27 (32–33); III (without pedicel), 19–22 (25–26); IV, 24–28 (26–28); V, 18–19 (19–22); VI, 25–27 (17–19); VII, 6–8 (6–7); VIII, 7–10 (4–5).

Thorax as in female, but smaller; pterothorax distinctly broader than long. Pronotum 143–157 μ long; greatest width 200–211 μ; outer postero-angular setae 23–27 μ, inner ones 18–22 μ; posteromarginal setae 4–7 pairs. Mesonotum 66–70 μ long, 127–134 μ broad; metanotum 70–76 μ long, 152–158 μ broad. Wing-pads very small, 13–32 μ long.

Abdomen sculptured as in female; notches in subbasal lines somewhat more distinct than in female. Sternites III–VI each with a fairly small suboval area porosa; longitudinal/transverse diameters, in microns, of areas in 2 paratypes (1 in parentheses), III, 13/23 (23/29); IV, 12/19 (20/27); V, 12–19 (16/20); VI, 6/9 (3 dots of 6/6 each). Quite likely specimens will be found that lack an area porosa on sternite VI.

Holotype ♀, 3 ♀♀ (1 SMF), and 2 ♂♂ paratypes from Turkey, Malatya (= Malatia), taken in quarantine with *Digitaria* sp. seeds, 11 Feb. 1953, O. K. Courtney, at D. C., W-2126, lot 53–1379.

C. kurdistanus n. sp. belongs to the difficult *manicatus* group. The most conspicuous feature of the new species is the position of the 4 mesal ante-ocellar setae in pairs one behind the other; all other species of the *manicatus* s. str. group that I know have these 4 setae approximately in a transverse row. Moreover, the subbasal lines of the tergites have about 20–25 distinct, delicate, almost equally spaced notches along the posterior edge. In related species these lines are generally smooth, or have only occasional indistinct notches. In females of the new species, seta S3 on abdominal segment IX is about as long as combined segments IX and X, but is much shorter than the combined segments in comparable species. The male has areae porosae only on sternites III–V or III–VI, whereas males of most related species have these areas on III–VII and sometimes VIII. Species without areae porosae on VII or VIII have the mesal ante-ocellar setae in a transverse row, not one behind another, and the subbasal tergal lines do not have equally spaced notches.

Chirothrips mexicanus D. L. Crawford

Chirothrips mexicanus D. L. Crawford, 1909. Pomona Coll. Jour. Ent. 1(4): 114–115, fig. 51.

Argentina: Prov. Mendoza, Chacras de Coria, 7 ♀♀ on *Cynodon dactylon* (L.) Persoon, 19 Nov. 1960, L. A. Bahamondes.

Thailand: Bangkok, 1 ♀ taken in quarantine on grass, 2 Apr. 1962, H. A. Woolford, Hawaii 33281, lot 62-12887.

This species occurs in North, Central, and South America, southern Africa, Hawaii, Midway I., and the Philippines. Previous records in Argentina are for the provinces of Buenos Aires, Salta, La Pampa, La Rioja, and Santa Fé.

Chirothrips sensitivus Andre

Chirothrips sensitivus Andre, 1939 (June). Proc. Ent. Soc. Wash. 41 (6): 198–200, figs. 7, 10.

Chirothrips talpoides Hood, 1939 (Sept.). Rev. Ent. (Rio de Janeiro 10(2): 466–469.

This confirms the synonymy that I (in press) have indicated between these species. Kellie O'Neill kindly compared the two holotypes, which are in the U. S. National Museum.

Chirothrips spiniceps Hood

Chirothrips spiniceps Hood, 1915. Insecutor Inscitiae Menstr. 3: 12–15, pl. 1, fig. 8.

Kansas: Hodgeman Co., 1 ♀ on wheat, 23 May 1952, R. H. Painter, lot 53-4696.

New Jersey: Demarest, 1 ♀ swept from grass, 19 Aug. 1935, W. S. Fields, Cwfd. no. 194; 1 ♂ 1 ♀ from grass, 6 Sept. 1936, W. S. Fields, Cwfd. no. 352. Cresskill, 1 ♂ 2 ♀♀ on *Panicum virgatum* L., 6 Aug. 1939, J. C. Crawford, Cwfd. no. 747; same except 13 Aug. 1939, 2 ♂♂ 2 ♀♀, Cwfd. no. 749. Tenafly, 1 ♀ on grass, 13 Aug. 1939, J. C. Crawford Cwfd. no. 750. Englewood, 5 ♂♂ 5 ♀♀, on *Panicum virgatum* L., 20 Aug. 1939, J. C. Crawford, Cwfd. no. 752; same except 17 Sept. 1939, 4 ♀♀, Cwfd. no. 754.

South Dakota: Elk Point, 1 ♀ swept from winter wheat, 5 May 1915, C. N. Ainslie, Webster no. 8844.

Previous U. S. records for this species are Arizona, California, Florida, Louisiana, Massachusetts, North Carolina, Oklahoma, South Carolina, Texas, Utah, and Virginia.

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THE TRIVIAL NAME OF THE POTATO TUBERWORM
(LEPIDOPTERA: GELECHIIDAE)

RONALD W. HODGES, *Entomology Research Division, ARS U. S. Department of Agriculture,* Washington, D. C. 20560

Bradley (Entomologist's Gazette, 17: 227, 1966) expressed the opinion that the name *Gelechia terrella* Walker, 1864, should be used as the valid name for the species currently known as *Phthorimaea operculella* (Zeller). Walker's name is a junior secondary homonym of *Tinea terrella* Denis and Schiffermüller, [1775]. Stainton (List of the specimens of British animals in the collection of the British Museum, pt. 16: 71, 1852) transferred *terrella* D. & S. to *Gelechia*, and the species remained in *Gelechia* until 1870 when Heinemann (Die Schmetterlinge Deutschlands und der Schweiz, vol. 2, pt. 1: 235) placed it in *Bryotropha* Heinemann, 1870. According to article 59(c) of the *International Code of Zoological Nomenclature* a name rejected before 1960 as a secondary homonym is not to be restored as the valid name. In the case of *terrella* (Walker), Busck (*in* Dyar, U. S. Nat. Mus. Bull. 52: 502, [1903]) rejected the name as being preoccupied and used *operculella* as the valid name for the species. This action is adequate under the terms of the Code to maintain the use of *operculella* for the species.

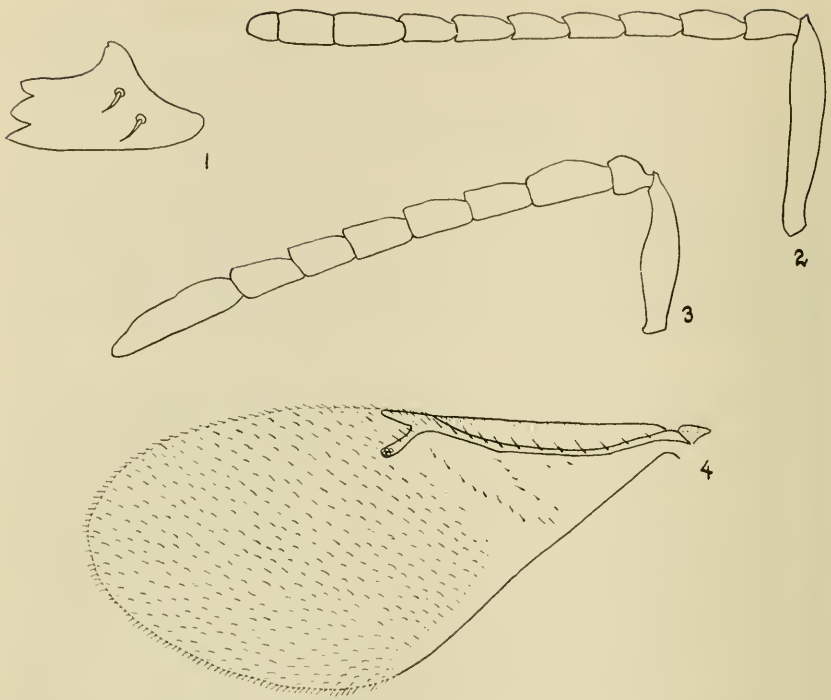
A NEW POLYEMBRYONIC PARASITE OF THE PEPPER MOTH (HYMENOPTERA: ENCYRTIDAE)

B. D. BURKS, *Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D. C.*

I am describing the following species of *Copidosoma* to make its name available for use in biological control investigations that are at present being conducted in the West Indies. It is a primary, polyembryonic parasite that attacks the larva of the pepper moth, *Gnorimoschema capsicum* Bradley and Povolný, in Trinidad and Puerto Rico.

There is at present little uniformity in the application of the generic name *Copidosoma* Ratzeburg. The usage by Peck *in* Muesebeck *et al.* (1951) or in his later catalog (1963) shows the widest possible application of the name. In his treatment, *Copidosoma* has a lengthy synonymy, including *Litomastix* Thomson, *Berecyntisus* Ghesquière (= *Berecyntus* Howard), *Neocopidosoma* Ishii, *Arrenoclavus* Doutt, and several others that have appeared in the literature very little. The characterization by Hoffer *in* Kratochvíl (1957), in which *Copidosoma* and *Litomastix* are recognized as distinct and the other genera just listed are not considered, probably represents the concept of *Copidosoma* that is accepted by most contemporary workers on Chalcidoidea. De Santis (1963), however, uses *Copidosoma* in a more restricted sense, employing the subgenera *Verdunia* Mercet and *Copidosoma s.s.* under *Copidosoma*, and maintaining *Litomastix* and *Arrenoclavus* as distinct genera.

In order that the relationships of the species I am describing here may be evident, I should make it clear how I am employing the name *Copidosoma*. This species has an exserted ovipositor, the gaster is bilaterally compressed, and the antennal club is apically rounded. It will, thus, run to *Copidosoma* in Mercet's key (1921) and to *Copidosoma s.s.* in De Santis's key (1963). There are, however, authentically determined European specimens of *C. boucheanum* Ratzeburg, the type-species of *Copidosoma*, in the U. S. National Museum collection, and when I compared this species with them, I found it difficult to believe that the two were congeneric. On the other hand, the National Museum collection also contains authentic material of the type-species of almost all the other genera listed by Peck as synonyms of *Copidosoma*, and all of them agree less well with this species than does *boucheanum*. Clearly, as the classification now stands, this species is a typical *Copidosoma*, although not at all closely related to the type-species.



Figs. 1–4. *Copidosoma capsicum*, n. sp. Fig. 1, mandible; fig. 2, antenna of ♀; fig. 3, antenna of ♂; fig. 4, forewing of ♀.

Copidosoma capsicum, new species

Female.—Length, 1.25 mm. Head dark metallic green or blue-green; mesoscutum black anteriorly, shading to bright green, clothed with sub-appressed, silvery hairs; scutellum dark green; propodeum and gaster smooth, shining green; antennal scape black, pedicel and flagellum brown; wings hyaline, marginal and postmarginal veins darkened; anterior legs, including coxae, white; middle and hind coxae black, apical third to half of each hind femur black, legs otherwise white.

Length of malar space half eye height; ocellocular line one-half diameter of lateral ocellus; apex of scrobe cavity slightly above center of frons and apical margin of scrobe cavity not sharp; eyes not hairy; mandible with three teeth, ventral one slightly the longest and acute, middle one broad and relatively blunt, dorsal tooth smallest, fig. 1. All funicular segments of antenna longer than broad, club broader than funiculus, rounded at apex, and as long as basal two funicular segments, fig. 2.

Mesoscutum almost smooth, very faintly sculptured; tegulae shagreened; forewing, fig. 4, with marginal and postmarginal veins broadened, stigmal vein as long as the two combined; scutellum with longitudinal, lineolate sculpture, this tending to converge basally and apically.

Propodeum and gaster smooth, shining; gaster as long as thorax, compressed in

apical half, ovipositor sheaths flattened and exserted for a distance as great as half the length of the gaster; apical gastral sterna exserted, keel-like.

Male.—Length, 1.00 mm. Head bright green; antennal scape and flagellum tan; color otherwise as in female. Antenna, fig. 3, with sub-serrate funiculus.

The distinctive color pattern of this species, with white anterior coxae and the apical half of the hind femur black, should set it apart from all other known species of *Copidosoma*. There is at present only one Neotropical species of *Copidosoma s.s.* This is *hyalinistigma* De Santis (1963). It has a much shorter postmarginal vein and first funicular segment than does *capsicum*.

Type locality.—Curepe, Trinidad, W. I.

Type.—U.S.N.M. No. 69067.

Described from 68 female and 47 male specimens, as follows: Type female, allotype ♂, and 11 ♀, 1 ♂ paratypes, Curepe, Trinidad, W. I., Jan. 1966, reared from *Gnorimoschema capsicum* in pepper pods, F. D. Bennett; 46 ♀, 32 ♂ paratypes, same data, but Dec. 1965; 10 ♀, 13 ♂ paratypes, Rio Piedras, Puerto Rico, 1940, reared from *Gnorimoschema* sp. in pepper, F. Seín. Numerous additional specimens, not included in the type series, from both Trinidad and Puerto Rico.

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A NEW SYNONYMY IN THE TRICHOPTERA

Through the courtesy of S. G. Jewett, Jr., I have had the opportunity to study a series of two males and two females of the caddisfly commonly identified as *Dicosmoecus aureoventris* Davis. The females were carefully compared to figures and notes I had made of the female type of *Drusinus frontalis* Banks, with the result that the following synonymy became apparent:

Dicosmoecus frontalis (Banks)

Drusinus frontalis Banks, 1943, Bull. M.C.Z., 92: 350–351. Ross, 1944, Bull. Ill. Nat. Hist. Surv. 23(art. 1): 300.

Dicosmoecus aureoventris Davis, 1949, Ann. Ent. Soc. Amer. 52: 449–450. Schmid, 1955, Mitt. Schweiz. Ent. Ges. 28: 36. **New Synonymy.**

Pseudostenophylax frontalis; Schmid, 1955, Mitt. Schweiz. Ent. Ges. 28: 112.

Dicosmoecus frontalis; Flint, 1966, Proc. U. S. Nat. Mus., 118: 378.

The species is known from Washington (Mt. Adams, Mt. Ranier, Sherman Pass Ferry Co.) and British Columbia (Terrace).—Oliver S. Flint, Jr., *Department of Entomology, Smithsonian Institution, Washington, D. C., 20560.*

THE COLLECTION OF CHEUMATOPSYCHE ANALIS IN HAWAII
(Hydropsychidae: Trichoptera)

D. G. DENNING and J. W. BEARDSLEY,[1] *Moraga, California and University of Hawaii, Honolulu, Hawaii, respectively*

To date only one trichopteran has been recorded from the Hawaiian Islands, *Oxyethira maya* Denning. It was collected by E. C. Zimmerman on October 10, 1940 at Moanalua Gardens, Honolulu, Oahu. The species was originally described from Georgia. Blickle (1962) has recorded the species from several localities in Florida.

Recently the junior author examined the combined catches of about thirty New Jersey type light traps operated at scattered locations on Oahu by the State Department of Public Health. In these collections specimens of a caddisfly were found. This species, *Cheumatopsyche analis* (Banks), represents the second caddisfly known to occur in the Hawaiian Islands. One male and three females were taken on Oahu, October 15, 1965, and two females in November, 1965. Since December, 1965 about one hundred fifty specimens have been collected in January, February, March, April and May 1966 (to date of this manuscript).

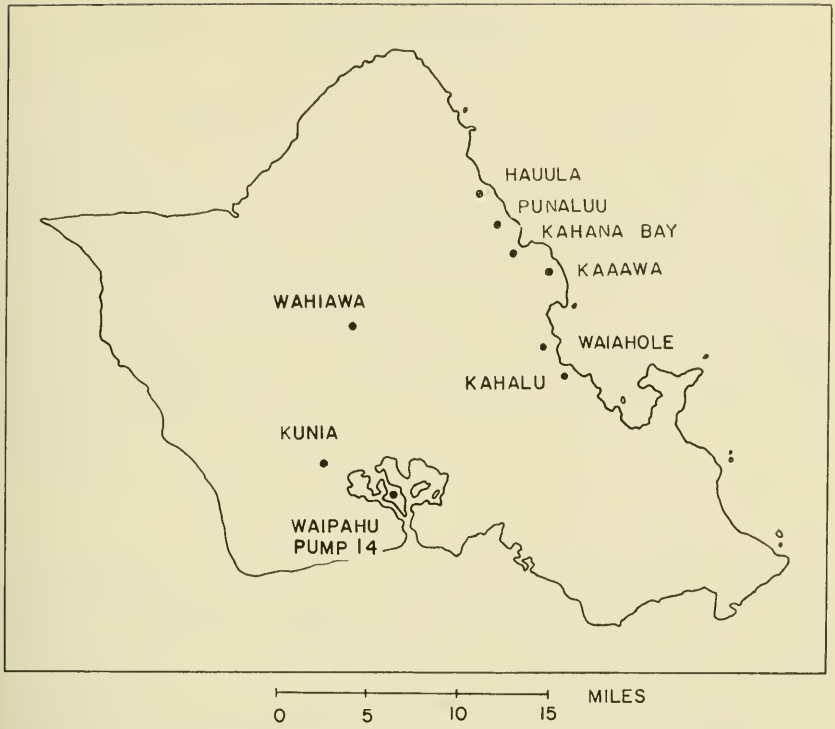
The map of Oahu shows the location of nine light traps from which *C. analis* have been collected. The light traps at Kaaawa, Kahana Bay, Punaluu, Hauula, Kahalu and Waiahole are in the moist windward portion of the island; the light traps at Kunia and Waipahu are located in irrigated sugar cane fields in the drier area of the island; the light trap at Wahiawa is on the drier central plateau.

The range of *C. analis* is large, extending from the Atlantic coast to British Columbia and eastern Washington and Oregon. The senior author has identified specimens from: Nova Scotia, Newfoundland, Maine, New Hampshire, New York, Pennsylvania, Ohio, Massachusetts, Nebraska, Manitoba, North Dakota, Minnesota, Colorado, Idaho, eastern Oregon and eastern Washington.

During the past several years large numbers of *Oxyethira maya* have been collected in light traps at various locations on Oahu by the junior author.

On May 30, 1966, a collection of *Cheumatopsyche* larvae was found under rocks in the swift water of Opaeula Stream, Oahu. The larvae of *Cheumatopsyche analis* will subsequently be described. Accordingly, *C. analis* is now established on Oahu. On the basis of the large numbers of *Oxyethira maya* collected and the widely scattered collec-

[1] The authors wish to express their gratitude to Mr. Sam Fluker, University of Hawaii, Honolulu, Hawaii, for sorting the caddisfly adults from many of the light trap catches and for assistance in locating the larvae.



Location of light traps where adults of *C. analis* were taken during February–May, 1966 on the Island of Oahu.

tion locations, it may be assumed that this species is also established on Oahu.

It is a matter of conjecture how either of these species reached Oahu. Their survival from their point of origin seems unlikely other than as gravid females. If the postulation of Zimmerman (1942) is correct that entrance to Hawaii was gained "by accompanying imported aquatic plants," survival in the egg stage would be easier than as larvae. The immature *Cheumatopsyche* known to the writers require cool, fairly well aerated water.

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TAXONOMIC NOTES ON KENTROTRYPHON, KTENOSTILPNUS, AND PARENTYPOMA

(Hymenoptera: Ichneumonidae)

Henry Townes, *American Entomological Institute*

The genus *Kentrotryphon* was proposed by P. Gabriel Strobl in 1902 (Mitt. Naturw. Ver. Steiermark 39: 71). He based it on a single species *Kentrotryphon longicaudatus*, which he described from a female specimen collected at 2,000 meters in the Austrian Alps. No second specimen has since been identified and the genus has been an enigma. The type is in the Steiermärkisches Landesmuseum Joanneum, Graz, Austria. Through the kindness of Dr. Günter Morge (custodian of the Strobl collection of the Natural History Museum, Admont, Austria), and with the cooperation of custodian Dr. Karl Mecenovic and Dr. Erich Kreissl of the Joanneum Graz, this type was sent to Dr. J. Oehlke at the Deutsches Entomologisches Institute, Eberswalde, and then forwarded to me for study.

Kentrotryphon proves to belong to the subfamily Microleptinae, and is related to *Entypoma* and *Allomacrus*, more closely to *Entypoma*. It might be considered a synonym of *Entypoma*, but there are enough differences to justify maintenance as a separate genus, at least until the genera of Microleptinae can be revised.

For comparison with *Kentrotryphon*, I have 3 ♂, 1 ♀ of *Entypoma robustum* Foerster, the ♀ compared with Foerster's types in Munich. I also have a single ♀ from Mt. McKinley, Alaska, which is closely related to *E. robustum* but probably represents a separate species. From the Philippines (mountains of Luzon), I have a third species which seems to be an *Entypoma* but which lacks the areolet in the front wing. Using the above mentioned specimens as representing the genus *Entypoma*, I find that *Kentrotryphon* may be compared with *Entypoma* as follows:

Kentrotryphon: Very similar in habitus and general structure to *Entypoma*, but the legs and flagellum somewhat more slender; clypeus wider and flatter than in *Entypoma*, resembling the clypeus of *Allomacrus* but not quite so wide: mesopleurum mostly mat rather than subpolished; areolet slightly shorter than in *Entypoma robustum*, and with the apico-posterior side a little longer, so that it is subrectangular rather than subtriangular; dorsal valve of ovipositor tip with a sharp subapical dorsal notch. In *Entypoma* the dorsal valve of ovipositor has a weak subapical constriction in place of the usual notch. The strongest difference between *Entypoma* and *Kentrotryphon* is in the clypeus.

With the type of *Kentrotryphon longicaudatus*, I received also the types of *Ktenostilpnus aequiarticulatus* Strobl and of *Paraentypoma*

femoratum Strobl. These are the type-species of *Ktenostilpnus* and of *Parentypoma*. *K. aequiarticulatus* is a synonym of *Phrudus monilicornis* Bridgman. Strobl described *aequiarticulatus* from male and female syntypes. The male specimen is hereby designated lectotype. The type of *Parentypoma femoratum* is a *Dialipsis* which agrees with the original descriptions of *D. mesomelana* Foerster and of *D. crassipes* Thomson, but I know these two "species" only from their brief descriptions, and it may be that all three names are synonyms. I have not yet seen convincing evidence that there is more than one valid species in *Dialipsis*. The "generic" characters of *Dialipsis* appear rather to be the specific characters of an aberrant species of *Plectiscidea*.

The above findings on *Ktenostilpnus* and *Paraentypoma* agree with those of Roman, who has already synonymized these two genera with *Phrudus* and *Dialipsis*, respectively (1924, Arkiv för Zool. 17 A (4): 21, 32).

MACROSIPHUM ROSAE (LINNAEUS) ON ILEX
(HOMOPTERA: APHIDIDAE)

Collections of the rose aphid in the first half of 1966 in Calif., Del., D. C. and N. Y. on *Ilex* spp. reminded me that I knew of several other collections on *Ilex* made within the past few years. It seemed, therefore, desirable to gather together the available records of the rather infrequent and usually light occurrence of the rose aphid on holly.

CALIFORNIA: Los Angeles State and County Arboretum, Arcadia, 5 April, many alatae and a few very young nymphs from *Ilex* sp. and 12 April 1966, a number of aphids in all states on *Ilex cornuta* (H. G. Walker coll.—Russell & Leonard det.). DELAWARE: Newark, 16 May 1960, 2 alatae collected on *Ilex* sp. (P. P. Burbutis coll.—M. D. L. det.); Dover, 20 May 1966 on *Ilex opaca*, 1 alata, several small nymphs (D. F. Bray coll.—M. D. L. det.). DISTRICT OF COLUMBIA: West Potomac Park, 7 May 1966 on *Ilex* sp. (H. L. G. Stroyan coll. & det.). MARYLAND: Hyattsville, 28 May 1958 on *I. cornuta* (T. L. Bissell coll. —1 slide in U.S.M.N.). Bethesda, June 1960 on *I. cornuta* (C. W. Sabrosky coll. —L. M. Russell det.). Centerville, 14 June 1961 on *I. aquifolium* (W. T. Johnson coll.—L. M. Russell det.). NEW JERSEY: Moorestown, 29 May 1960, a small colony, mostly alatae on *I. verticillata* (D. W. Jones coll.—L. M. Russell det.) *in* Jour. N. Y. Ent. Soc. 72:90, 1964. NEW YORK: Orient, L. Id., 7 July 1961 on *I. verticillata* "on leaves, very hard to find, some alatae present." (Roy Latham coll.—J. O. Pepper det.). Lockport, 25 June 1966, 3 alatae and several apterae on the terminals of *I. aquifolium* in a home garden (L. L. Pechuman coll.—L. M. Russell det.). ENGLAND: Wheathamsted, Hertfordshire, 12 June 1943 and Cambridge, 7 June 1949 on *Ilex* sp. (H. L. G. Stroyan coll. & det.).—MORTIMER D. LEONARD, *Collaborator, Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D. C.*

NOTES ON THE TACHINID GENUS CYLINDROMYIA IN NORTH AMERICA
(Diptera)

Curtis W. Sabrosky, *Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D. C.*

Aldrich's revision of the common and characteristic tachinid genus *Cylindromyia* Meigen (1926, U. S. Natl. Mus. Proc. 68, Art. 23: 1–27, 1 pl.) has remained a standard and highly useful work. The figures of the male and female genitalia have assured proper identifications in most cases. No species have been added for North America since then, although a few names have been changed by reason of synonymy or homonymy. For an up-to-date list and bibliographic references, see Sabrosky and Arnaud (1965, in Stone et al., A Catalog of the Diptera of America North of Mexico, pp. 972–974).

During review of material in the preparation of the section on Tachinidae for the Catalog, a few notes were accumulated on *Cylindromyia* that are here placed on record to supplement the Aldrich revision and assist users of his key. Unless otherwise noted, material referred to is in the collection of the U.S. National Museum.

As numbered in this paper, the second and third abdominal segments are the anatomically correct ones. Aldrich, in agreement with common usage, ignored the narrow and small first segment and called these the first and second segments.

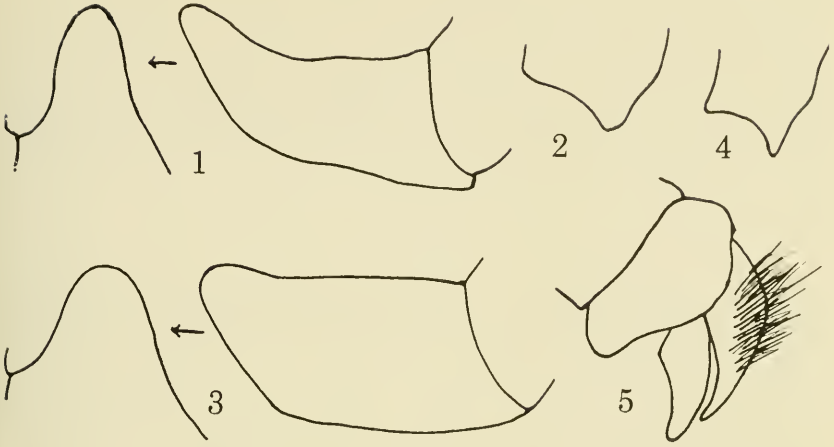
Subgeneric classification

From *Cylindromyia* (or *Ocyptera*) of older authors, Townsend at various times segregated five "genera," in addition to *Cylindromyia* s. str. In the Diptera Catalog, however, only one genus, *Cylindromyia*, is recognized, with three subgenera. It may reasonably be doubted that these are even of subgeneric value, but they are at least convenient units that may be used to group species related by the modifications of the female abdomen, as follows:

Subgenus *Apinocyptera* Townsend: Female abdominal segments 2 and 3 subequal in length; third segment ventrally with a spine-studded protuberance.

Subgenus *Neocyptera* Townsend: Second segment elongated and somewhat enlarged caudad, with numerous spines ventrally; third segment not protuberant, of ordinary length, with scattered spines ventrally.

Subgenus *Cylindromyia* Meigen s. str.: Abdomen "normal," i.e., of



Figs. 1–5. Fig. 1, last genital segment of female, and 2, lower margin of last genital segment of male, *Cylindromyia dosiades dosiades* (♀, Lafayette, Ind.; ♂, Cheboygan Co., Mich.); figs 3 and 4, same for *C. dosiades lobata* (♀ paratype, Chesapeake Beach, Md.; ♂, Mount Vernon, Va.). Fig. 5, male genitalia, *C. compressa* (Custer Co., Idaho).

the common appearance in the genus, with second and third segments subequal in length and without protuberances or spines.

Cylindromyia alticola Aldrich is a peculiar species and might justify still another subgenus, for which the name *Aldrichocyptera* Townsend would be available.

Cylindromyia dosiades (Walker)

This has been regarded as a common and widespread species, easily recognized by having only a single pair of scutellar bristles. However, there are two distinct types of females, differentiated by the proportions of the last genital segments. Unfortunately no completely reliable character has been found for separation of the males, although the shape of a process on the ventral margin of the second or last genital segment is useful, though variable. Typical *dosiades* is widespread across Canada and the northern United States. The second form ranges in eastern United States. It appears that the latter is not completely and sharply demarcated from the typical population, and I choose to consider it a subspecies.

C. dosiades dosiades (Walker)

Last genital segment of female (fig. 1) in profile comparatively narrow and tapering, the lobes relatively narrow when viewed from

below. Lower margin of last genital segment of male (fig. 2) with a usually broadly rounded process.

This is the typical form, according to sketches kindly made from the female holotype in London by Roger W. Crosskey. Additional material now before me from the Canadian National Collection, loaned through the kind cooperation of J. F. McAlpine, permits modification of the distribution stated in the Diptera Catalog to "Alaska, B. C. to N. S., s. to Calif., Colo., and N. Y."

C. dosiades lobata, new subspecies

Last genital segment of female (fig. 3) shorter and broader in profile, and the lobes broader, than in typical *dosiades*. Lower margin of last genital segment of male (fig. 4) with a usually narrow process, usually ending somewhat acutely.

This subspecies occurs in eastern United States, with records from southern Michigan to Massachusetts, south to Georgia.

Holotype female, College Park, Md., June 9, 1935 (C. T. Greene). Type No. 69089 in the U. S. National Museum. Paratypes (26, all females): *Conn.*: Canaan, Aug. 15–16, 1939 (A. Stone); Lyme, June 16, 1918 (Champlain) and July 5, 1918 (W. S. Fisher). *Md.*: Glen Echo, July 9, 1922 (J. R. Malloch); Beltsville, June 28, 1917 (L. O. Jackson) and July 26, 1917 (C. T. Greene); Chesapeake Beach, May 30 (J. M. Aldrich) and Aug. 16, 1926 (J. R. Malloch). *Mich.*: Nottawa, Aug. 25, 1950 (Sabrosky); Shiawassee Co., Aug. 17, 1946 (R. R. Dreisbach). *N. J.*: 3, Iona, Sept. 12, 1909; Glassboro, Nov. 9, 1896; Clementon, Sept. 11, 1909 (C. M. Greene), Aug. 30 and Sept. 4, 1908. *N. Y.*: Ithaca, July 9, 1884; Wilmington Notch, Adirondacks, July 2 (J. M. Aldrich). *Penn.*: Pocono Lake, July 11, 1911; Harrisburg, Aug 11 (W. R. Walton). *Va.*: Great Falls, Sept. 25, 1913 (R. C. Shannon) and May 23, 1918 (C. T. Greene); Falls Church, June 25, 1917 (C. T. Greene); Chain Bridge, July 16, 1923 (H. W. Allen); Glencarlyn, June 5, 1918 (C. T. Greene). The Michigan paratypes are, respectively, in my own collection and in the Museum of Zoology, University of Michigan.

To eliminate possible misidentifications, no males have been included in the type series. In addition to males from some of the above localities and States, I have before me male specimens that I judge to be this subspecies, from D. C., Ga., Ind., Mass., N. C., and Ohio.

Cylindromyia compressa Aldrich

Aldrich described the species from a single female from Alberta. He actually had three males of *compressa* in material before him, but the similarity of genitalia caused him to record the three as aberrations of *dosiades* with apical scutellar bristles. These are the males from Laggan, Alta., Colorado, and Bottineau, N. Dak., recorded at the

bottom of page 9 of his revision. In addition, I have also seen four other males of *compressa*, two each from Baker, Nev., July 24, 1939 (T. O. Thatcher), and 20–25 miles ne. Stanley, Custer Co., Idaho, Sept. 12, 1964, sweeping *Aster* and *Grindelia* (J. Schuh, W. C. Peters).

As Aldrich surmised in his key (p. 7, couplet 3), the males differ from those of *californica* (Bigot) [*intermedia* Meigen of the Aldrich key] in having a normal fore tarsus, not concave posteriorly, and the hind tibia not villous on the inner side. The male genitalia are nearest to those of *dosiades*, and are figured here (fig. 5) for comparison with those of *dosiades* and also with *californica* (cf. figs. 7 and 2 of the Aldrich revision). The posterior forceps in profile are strongly tapering, with posterior margin curved, and densely haired, the hair tuft occupying much more of the forceps than in *dosiades*. The anterior forceps are broader than in *dosiades*, and they broaden sharply to an anterior basal angle.

All the males have two pairs of scutellar bristles, the long subapical pair and a small decussate apical pair. This character is more consistent than even Aldrich thought. However, discal bristles on the abdomen are quite variable. Of the seven males before me, two have a pair of discals on both second and third segments, one has a single unpaired discal bristle on both those segments, two have a pair of discals on the second only, and two have the second segment showing two single bristles on the mid line, possibly representing a lone discal and a lone marginal.

Cylindromyia binotata (Bigot) and **C. fumipennis** (Bigot)

Aldrich's couplet 19 is rather weak, as it depends on the more or less variable character of marginal bristles. Comparison of Aldrich's figures 27 and 28 shows that the female genital segments and their distal hooks offer a far better means of separation. In *binotata* (*argentea* in Aldrich), the genital hooks are small and close to the well-developed, shoulderlike apical angle of the segment, whereas in *fumipennis* (*vulgaris* in Aldrich) the hooks are large and strongly curved, fingerlike, and not close to the apical angle of the segment, which is sloping and undeveloped.

A NEW BRAZILIAN BEROSUS AND A DESCRIPTION OF THE FEMALE OF B. SPECTATUS D'ORCHYMONT

(COLEOPTERA: HYDROPHILIDAE)[1]

PAUL J. SPANGLER, *Department of Entomology, U. S. National Museum, Smithsonian Institution, Washington, D. C.*

Through the kindness of my friend Colonel Moacir Alvarenga from Rio de Janeiro, Brazil, I received numerous aquatic beetles collected by him at light from Jacare, P. N. Xingu, Matto Grosso, Brazil. Among these specimens were two interesting species of *Berosus* Leach belonging to the group in the subgenus *Enoplurus* that have testaceous or partially ferrugineous heads. One of these is a new species and it is described below. The other is *Berosus* (*E.*) *spectatus* D'Orchymont, a species previously known only from three males. The female of this species is described for the first time and distinguishing characters are illustrated.

Berosus (E.) latipalpus, sp. n.

(Figs. 1–5, 16–18)

This distinctive new species runs to *B. truncatipennis* Castelnau in Mouchamp's key (1963) because the male and female both have spinous elytral apices. However, the remarkable genitalia, male protarsal claws, mesosternal lamina and emargination of the last abdominal sternum suggests that this species is more closely related to *B. masculinus* Knisch and *B. hamatus* Knisch. This new species may be distinguished from the three species mentioned above by the flattened and expanded terminal segment of the maxillary palpus (figs. 1, 6, 7, 10); from *masculinus* and *hamatus*, which it more closely resembles, it may be separated also by the different shape of the mesosternal lamina (figs. 2, 8, 11), by the outer tarsal claw of the male (fig. 4a) and different male genitalia (figs. 16–22).

Length of holotype male 7.0 mm., greatest width 3.5 mm. Color of head testaceous in apical half, ferrugineous in posterior half. Pronotum ferrugineous on disc, lighter laterally; with two medial, dark brown, longitudinal vittae extending from anterior margin posteriorly almost entire length of pronotum. Elytra ferrugineous but lighter laterally; with dark brown to piceous subvittiform markings as follows: intervals 2 through 6 and humerus each with one near base, markings on intervals 2 through 9 arranged from middle of outer margin posteriorly to suture in an obtuse diagonal band, subvittiform marking posteriorly on intervals 2 through 7 arranged in an acute diagonal band, and one preapical macula at junction of intervals 6, 7 and 8; sutural angle and elytral striae dark brown to piceous. Scutellum ferrugineous. Venter piceous except pro- and mesosternum and pro-, meso- and metacoxae ferrugineous to dark brown, other segments of legs testaceous and

[1] This study was made possible in part by Smithsonian Research Award No. 6.

protarsal claws piceous. Maxillary palpus testaceous except ultimate segment dark brown, almost piceous. Labial palpus testaceous.

Head moderately coarsely, densely punctate posteriorly; more finely punctate anteriorly; with dense micropunctation between normal punctures; labrum finely punctate. Pronotum subrectangular, almost twice as wide as long; finely margined anteriorly and laterally; anterior and posterior angles rounded; sides feebly arcuate; with dual punctation, larger punctures at most slightly larger than those of head and separated by a distance equal their width; micropunctures denser laterally. Elytra with distinctly impressed striae; stria 2 short, incomplete; striae 7 and 8 arising behind humerus, not from base; most punctures of striae and intervals on anterior half of elytra similar in size to larger pronotal punctures; posterior half of all intervals with very coarse, seta-bearing punctures; intervals 4, 6 and 8 with an additional row of very coarse punctures on anterior half; humeral angles smoothly rounded; sides finely margined; apical angles with sharp lateral spine; sutural angle obtuse and dehiscent as illustrated (fig. 3). Scutellum with punctures similar in size and density to those on pronotum. Legs with femora pubescent on basal two-thirds. Protarsus four segmented; basal segment subequal to second and third segments combined, moderately expanded, with pubescent pad along entire length beneath; second segment short, subequal to third, moderately expanded, with pubescent pad beneath; third segment not expanded, with a few tiny tufts of setae distally; fourth segment as long as second and third segments combined, without pubescence beneath; inner (anterior) tarsal claw long, stout at base then tapering to apex; outer (posterior) tarsal claw slightly longer than inner, narrower at base, with medial swelling as illustrated (fig. 4a). Venter with short, fine, dense, hydrofuge pubescence. Ultimate segment of maxillary palpus very broad, half as wide as long (fig. 1a). Mesosternal lamina large and arcuate as illustrated (fig. 2). Abdominal segments not carinate except incomplete lateral carina at each side of broad, arcuate emargination of fifth segment (fig. 5a). Aedeagus complex as illustrated (figs. 16–18).

Female: The allotype differs from the male as follows: ultimate segment of maxillary palpus less broadly expanded and not black, merely dark reddish brown on apex (fig. 1b); basal three tarsal segments not broadly expanded and lacking the pubescent pad; protarsal claws not broad or black, merely dark reddish brown on distal half (fig. 4b); both sutural and lateral spines of apex of elytra acute; fifth abdominal sternum not carinate, emargination sinuate, not arcuate (fig. 5b).

Holotype: Male; BRAZIL, Matto Grosso, Jacare, P. N. Xingu, XI-1965, at light, M. Alvarenga. Type No. 69135 deposited in the U. S. National Museum.

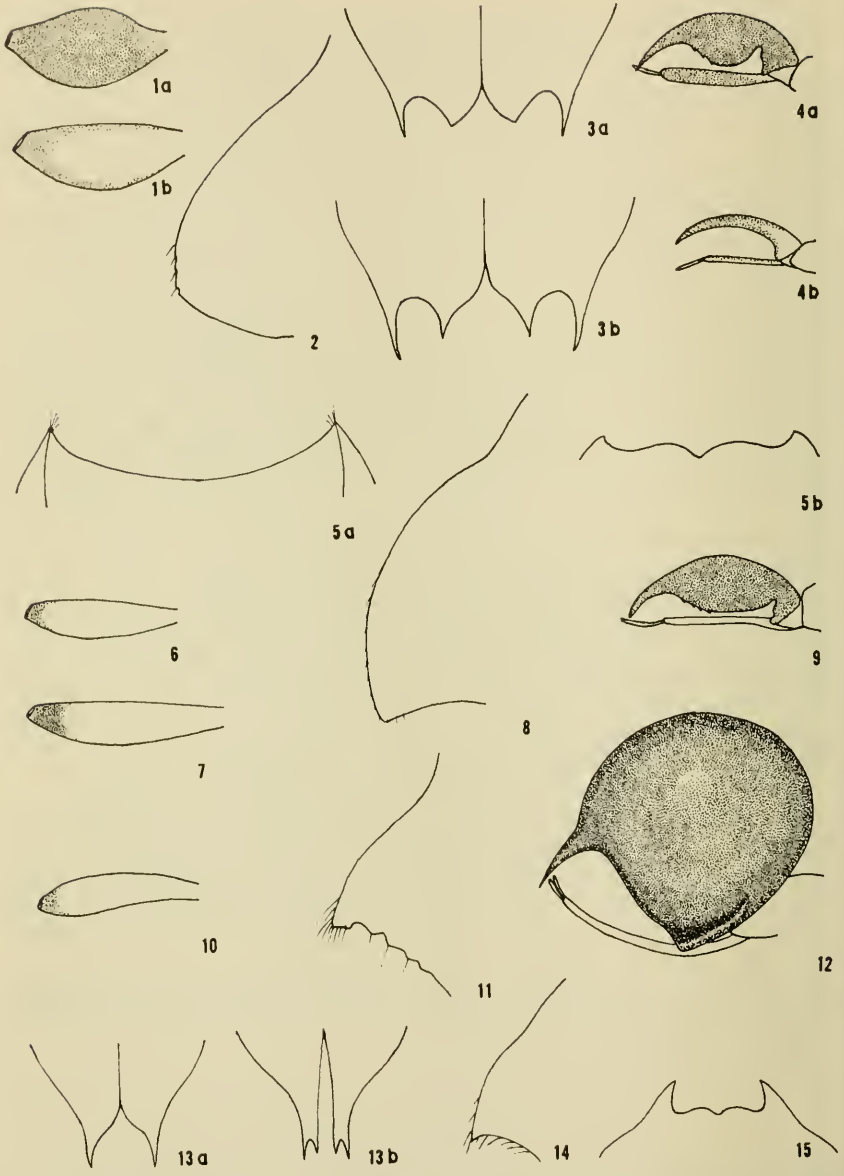
Allotype: Same data as holotype.

Berosus (E.) spectatus D'Orchymont

(Figs. 13–15)

Berosus (Enoplurus) spectatus D'Orchymont 1940:191; Mouchamps 1963:119.

When D'Orchymont (1940) described this species from males only, he gave the length of the type as 4.4 mm. More recently, when Mouchamps (1963) separated the species of *Berosus* (*Enoplurus*) having testaceous or partially ferrugineous heads, he divided them



Figs. 1–15. *Berosus* (*E.*) *latipalpus*, sp. n. Fig. 1, terminal segment, maxillary palpus, lateral view, a. male, b. female; fig. 2, mesosternal lamina, lateral view; fig. 3, apical angles, elytra, dorsal view, a. male, b. female; fig. 4, outer protarsal claw, lateral view, a. male, b. female; fig. 5, emargination, fifth abdominal sternum, ventral view, a. male, b. female. *Berosus* (*E.*) *truncatipennis* Castelnau. Fig. 6, male, terminal segment, maxillary palpus, lateral view. *Berosus* (*E.*) *masculinus* Knisch, male. Fig. 7, terminal segment, maxillary palpus, lateral view; fig.

into two groups according to size. Species less than 4.5 mm were grouped under the rubric A and those exceeding 4.5 mm. were grouped under A′. This division was satisfactory on the basis of information available at that time. However, now that the female has been associated with the male it develops that because of the extended elytral apices (fig. 13b), the female is larger than the male. Consequently, most males run to the species grouped under rubric A and the female runs to those grouped under A′ and to *obscurifrons* Knisch from which it is obviously distinct.

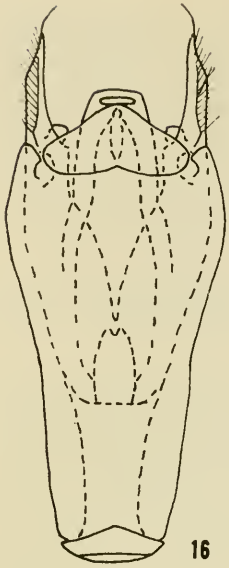
Because the female is larger and different enough from the male and could be mistaken for a new species close to *obscurifrons,* I believe it warrants the following description.

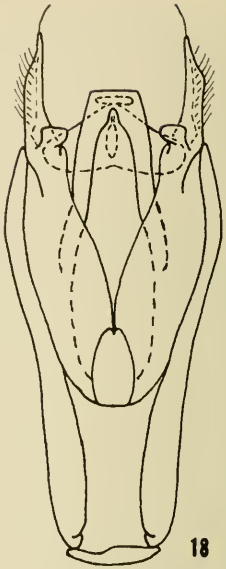
Length of female 5.5 mm., greatest width 2.5 mm. Color of head testaceous; pronotum testaceous and with two medial, slender, dark brown, longitudinal vittae on anterior third; elytra testaceous except poorly defined dark brown maculae as follows: one slightly behind scutellum between second and fourth striae, one very feebly defined humeral spot, one on intervals 2 through 9 arranged from middle of outer margin posteriorly to suture in an indistinct diagonal band, one poorly defined, preapical spot on interval 3 and on interval 5, spot on interval 3 posterior to the spot on interval 5; discal striae also dark brown. Scutellum testaceous. Venter testaceous. Palpi testaceous except apex of last segment darker brown; antennae and legs testaceous.

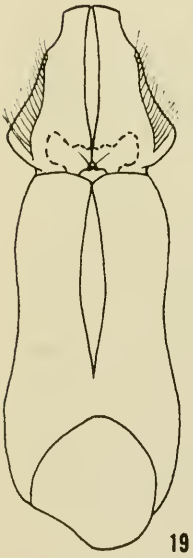
Head moderately coarsely punctate, punctures separated by a distance equal their width; punctures on clypeus much finer; labrum very finely punctate. Pronotum subrectangular, almost twice as wide as long; finely margined anteriorly and laterally; anterior and posterior angles rounded; sides almost parallel sided; punctures slightly finer than those of head, separated by one or two times their width, denser laterally. Elytra with distinctly impressed striae; second stria short, incomplete; seventh and eighth striae not arising from base but from behind humerus; strial punctures slightly larger than those of pronotum; punctures of intervals subequal to those of striae; second and fourth intervals with two indistinct rows of punctures at midlength of elytra; third interval with three indistinct rows of coarse punctures at midlength; humeral angles smoothly rounded; sides finely margined; apical angles very elongate and each bispinous as illustrated (fig. 13b) and each with a deep fovea on underside near apex. Scutellum moderately coarsely, sparsely punctate. Legs with femora pubescent on basal two-thirds. Protarsus of five segments, basal four segments subequal in length; ultimate segment equal to other four segments combined; protarsal claws very slender and long, equal in length to first three (proximal) tarsal segments combined, each claw with a minute basal tooth. Venter with short, fine, dense, hydrofuge pubescence.

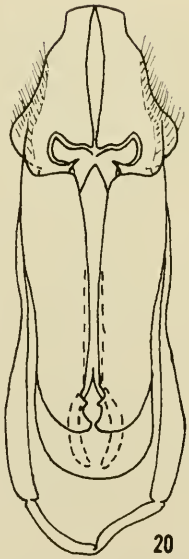
←

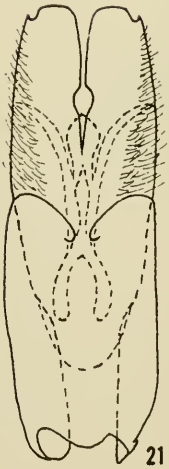
8, mesosternal lamina, lateral view; fig. 9, outer protarsal claw, lateral view. *Berosus* (*E.*) *hamatus* Knisch, male cotype. Fig. 10, terminal segment, maxillary palpus, lateral view; fig. 11, mesosternal lamina, lateral view; fig. 12, outer protarsal claw, lateral view. *Berosus* (*E.*) *spectatus* D'Orchymont. Fig. 13, apical angles, elytra, dorsal view, a. male, b. female; fig. 14, mesosternal lamina, lateral view; fig. 15, emargination, fifth abdominal sternum, ventral view, female.

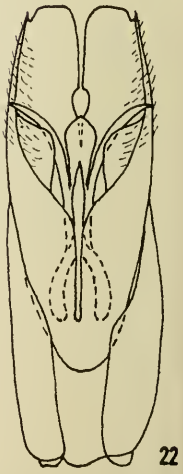












Figs. 16–22. *Berosus* (*E.*) *latipalpus*, sp. n., male genitalia. Fig. 16, ventral view; fig. 17, apex median lobe, lateral view; fig. 18, dorsal view. *Berosus* (*E.*) *masculinus* Knisch, male genitalia. Fig. 19, ventral view; fig. 20, dorsal view. *Berosus* (*E.*) *hamatus* Knisch, male genitalia. Fig. 21, ventral view; fig. 22, dorsal view.

Mesosternal lamina large, arcuate, with sharp recurved tooth (fig. 14). Abdominal segments without carinae. Fifth abdominal segment emarginate and sinuate, not dentate in emargination (fig. 15).

Male: Similar to female except elytral apices short, elongate and each unispinous (fig. 13a). Protarsus with four segments; basal segment twice as long as second segment, moderately expanded, with pubescent pad in apical half; second segment as long as third segment, moderately expanded, with pubescent pad in apical half; third segment not expanded, without pubescent pad; fourth segment subequal in length to other segments combined; protarsal claws very slender and long, equal to two basal tarsal segments combined.

Variations: There is very little variation in the 14 specimens available for study. The only differences observed are in size and in the extent and intensity of pigmentation of the vittae and maculae on the dorsum. Females varied in length from 5.0 to 5.8 mm. and males from 4.5 to 5.0 mm. The pronotal vittae on three specimens extend from the anterior margin posteriorly for two-thirds the length of the pronotum instead of one-third as described above for the female. The macula described from behind the scutellum and between the second and fourth striae is not present on some specimens.

Specimens examined: 3 ♂♂, 11 ♀♀ from BRAZIL, Matto Grosso, Jacare, P. N. Xingu, XI-1965, at light, M. Alvarenga. Specimens will be placed in the California Academy of Sciences, British Museum (Natural History), Muséum Nationale de Histoire Naturelle de France, Institut Royal des Sciences Naturelle de Belgique, and in the collections of Drs. R. Mouchamps and F. N. Young.

The illustrations of the apical angles of the elytra and the genitalia of *B. masculinus* and *B. hamatus* were drawn at a magnification of 15 ×. All other drawings were made at a magnification of 45 ×.

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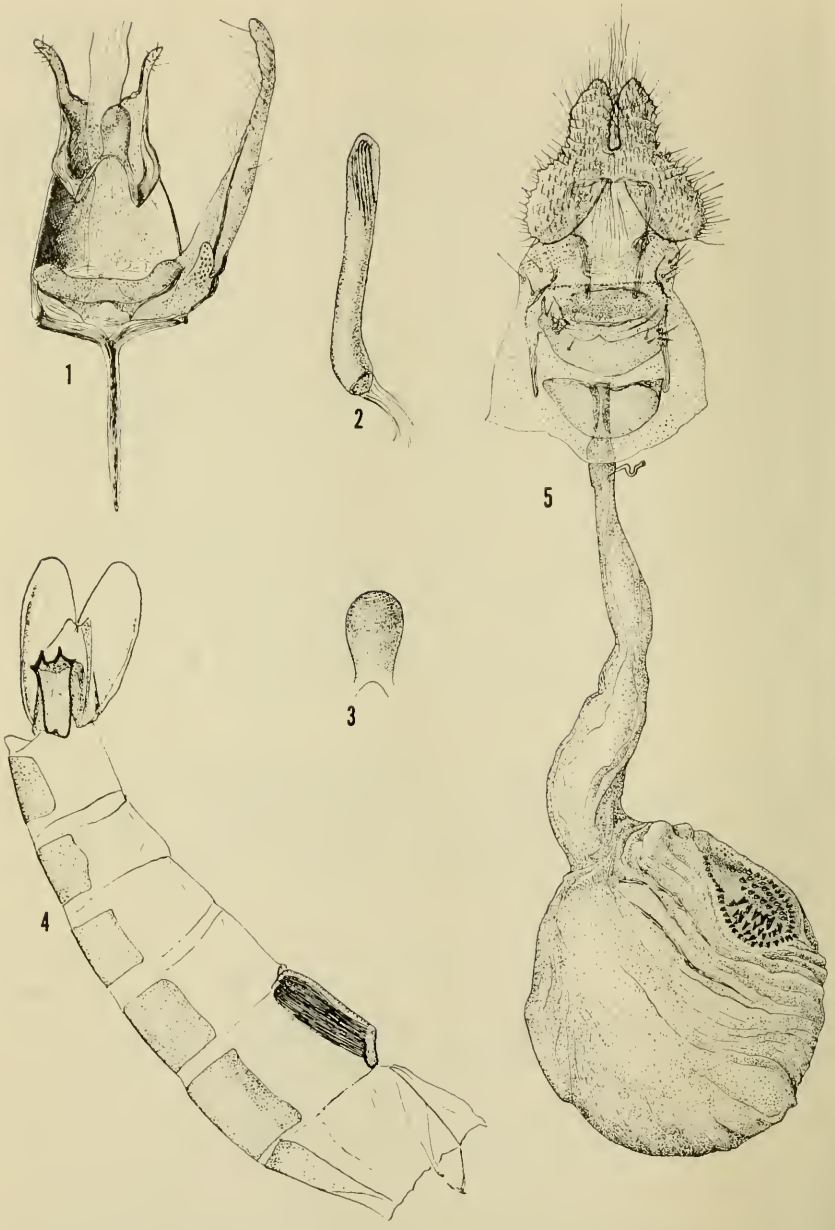
A NEW SPECIES OF ATTEVA FROM CENTRAL AMERICA
(LEPIDOPTERA: YPONOMEUTIDAE)

W. DONALD DUCKWORTH, *Department of Entomology, Smithsonian Institution, Washington, D. C.*

One male specimen of the species described herein was collected by the author in Panama in 1964. Subsequent examination revealed it to be a member of the yponomeutid genus *Atteva* and quite distinct from all other described members of the genus. In 1965, while collecting in Costa Rica, a large series containing both males and females of the



Atteva zebra, n. sp. Fig. 1, male genitalia (aedeagus removed); fig. 2, aedeagus; fig. 3, enlargement of ventral plate of gnathos; fig. 4. abdomen; fig. 5, female genitalia

Fig. 6, *Atteva zebra*, n. sp.

same species was obtained in Turrialba. Although a complete revision of the genus is planned for the future, it seems desirable to provide a description for this striking species to facilitate further studies.

Although the host plant for this species is not known, it is reasonable to assume that it will prove to be a member of the Simaroubaceae since all the other species of *Atteva* for which a host plant is known are restricted to this family of plants.

The author wishes to acknowledge with thanks the aid of the following individuals. Mr. Andre Pizzini for the drawings, Mr. Jack Scott for the photograph and Mrs. Sandra Duckworth for assistance in both the field and laboratory.

Atteva zebra, n. sp.

Alar expanse 20–25 mm.

Antenna black, increasingly shaded with white from base to apex. Head white, face white with patch of black scales between eyes; second segment of labial palpus white with scattering of black scales, apical segment black. Legs in female black shaded with white, joints white; in male, hindlegs white with long white scales from tibia. Abdomen white in males, dark gray in females; a

pair of hair pencils are enclosed in a pocket on the third abdominal tergite of male. Thorax white with a median black line; tegulae white with two lateral black spots. Forewing white; costa narrowly edged with black from base to just before apex; three black spots along dorsum on basal one-fourth followed by a black streak extending to tornus; a median black streak from one-third to two-thirds preceded and terminated by more or less separate black spots; three or four black spots from costa to midline on basal one-third; a black subcostal streak from basal one-third to apex irregularly interrupted into spots or dashes to apex; one black spot at midline of tornus; cilia white, black basally in proximity to apical and tornal spots. Hindwing in male whitish at base darkening to gray at apex, cilia long, white at anal angle, gray beyond; in female, dark gray.

Male genitalia (see figure, slide WDD 3619, type): Enclosed in pouch formed by two large flaps arising from the pleural region of the eighth abdominal segment. Harpe narrow, particularly beyond midpoint; ventral plate of gnathos spoonlike with numerous microscopic spines; aedeagus simple, vesica armed with cornuti. Posterior margin of eighth sternite with two acute projections.

Female genitalia (see figure, slide WDD 3620, paratype): Ovipositor lobes large, with deep median cleft; lamella antevaginalis and lamella postvaginalis simple; ostium bursae sclerotized; ductus bursae and corpus bursae membranous, signum a pear-shaped, dentate plate; inception of ductus seminalis near ostium.

Type: Barro Colorado Island, Canal Zone, Panama. USNM 69101.

Distribution: PANAMA: Barro Colorado Island (May). COSTA RICA: Turrialba (Feb., March, July).

Described from male holotype, "PANAMA: Barro Colorado Isl., 1–9. V.64, (WD and SS Duckworth);" one male paratype and nine female paratypes, "COSTA RICA: Turrialba, 17–21.II.65, (SS and WD Duckworth);" two male paratypes and four female paratypes, "COSTA RICA: Turrialba, 22–28.II.65, (SS and WD Duckworth);" one male paratype and three female paratypes, "COSTA RICA: Turrialba, 1–6.III.65, (SS and WD Duckworth);" two male and fifteen female paratypes, "COSTA RICA: Turrialba, 13–17.III.65, (SS and WD Duckworth);" and two female paratypes, "COSTA RICA: Turrialba, VII-15-19-65, (P. J. Spangler)."

This species is so distinct within the genus *Atteva* that it is difficult to compare it with other species. In general, the species of *Atteva* in the Western Hemisphere show two groupings based on structures of the genitalia. The *punctella* group has broad harpes and the ventral plate of gnathos hooklike in the male genitalia, and small ovipositor lobes and a sun-burst shaped signum in the female genitalia. The *fulviguttata* group has narrow harpes and the ventral plate of gnathos spoonlike in the male genitalia, and large ovipositor lobes and the signum a variously shaped dentate plate in the female genitalia. *A. zebra* falls into the latter group. Within the *fulviguttata* group, *zebra* is readily distinguishable by its striking maculation and the pair of hair pencils on the third abdominal tergite in the males.

DEUTONYMPHS AS ENDOPARASITES OF THE EASTERN BELTED KINGFISHER AND THE EASTERN GREEN HERON IN NORTH AMERICA (ACARINA: SARCOPTIFORMES: PTEROLICHIDAE)[1]

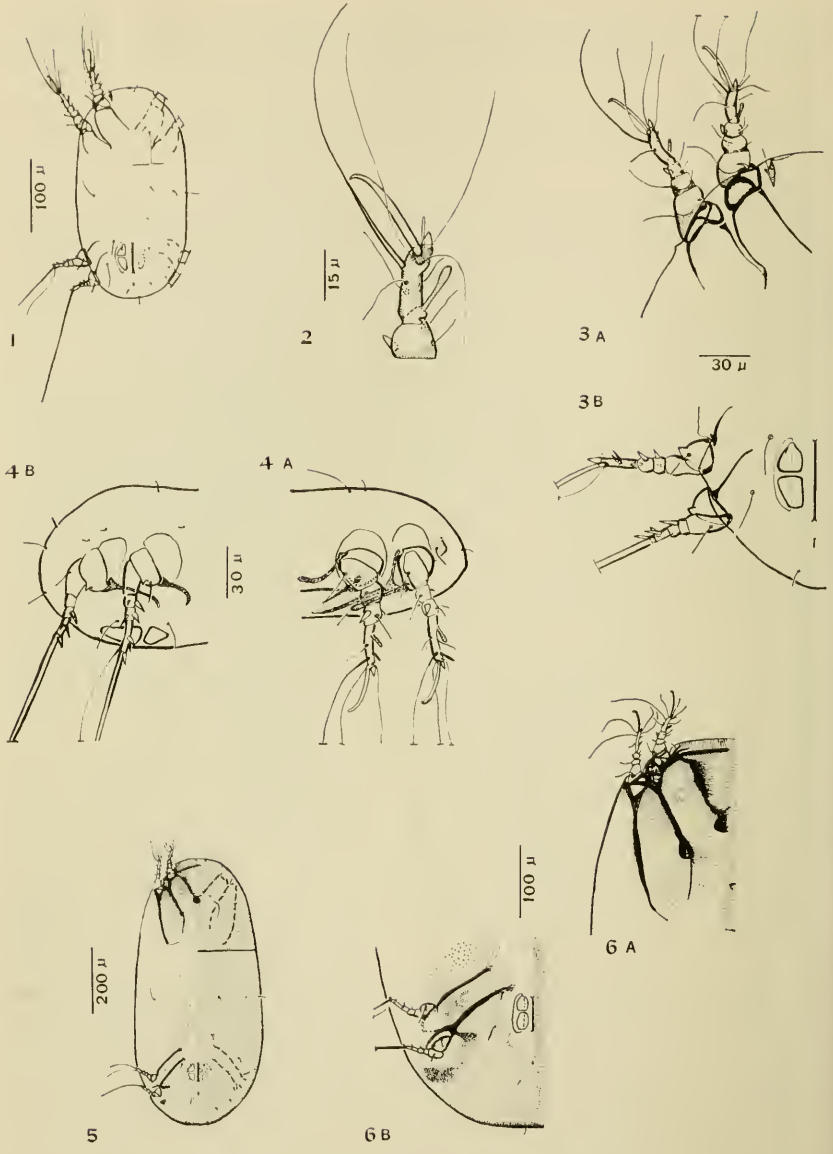
ELIZABETH M. BOYD, *Department of Biological Sciences, Mount Holyoke College, South Hadley, Massachusetts.*

Heteromorphic feather mite deutonymphs of two different species of mites were recovered: the one from the Eastern belted kingfisher, *Megaceryle alcyon*, and the other from the Eastern green heron, *Butorides v. virescens* in North America. There have been few reports of heteromorphic deutonymphs, which inhabit the subcutaneous tissue of birds, in the New World. According to Spurlock and Emlen ('42), the mite which they described as *Hypodectes chapini* n. sp. from the red-shafted flicker, *Colaptes cafer collaris*, in California, constitutes the second species specifically identified in North American birds. The first species is *Falculifer rostratus* Buchh. (Falculiferinae) from the pigeon: its deutonymph was first observed in the United States and on the pigeon by Garman (1884), and since by Kellicott (1892) and Beebe (1902). A subdermal deutonymph was reported but not illustrated from the little blue heron by Leidy (1890), and by Beebe ('02), who also collected it from the white ibis and the roseate spoonbill. Since these hosts belong to the order Ciconiiformes, this mite probably represents a third species and it may very likely be identical to that now described by the author from the green heron.

The deutonymphs of the subfamily Pterolichinae which have been illustrated from Old World hosts are *Ardeacarus ardeae* Can. from herons (Dubinin, '56); *Coraciacarus alcedinia* Filippi from the kingfisher, *Alcedo atthis*; *Gabucinia strigia* Gene from the short-eared owl, *Asio flammeus*; *G. nisi* Can. from the sparrow hawk and goshawk (*Accipiter nisus*, and *A. gentilis*) and *G. vulturis* from the griffon vulture, *Gyps fulvus* (Dubinin, '53). To this list should now be added three unnamed deutonymphs, two from the Indian white-headed ibis, *Tantalus leucocephalus* and one from a touraco, *Tauraco porphyreolophus* (Grünberg and Kutzer, '62a, '62b). In the past, various generic names have been assigned to some of these deutonymphs, such as *Cellularia* Montague, *Hypodectes* Fillipi, and *Hypoderas* Nitzsch (Grünberg and Kutzer, '62a).

Of 50 belted kingfishers examined for parasites, 22 were infested by heteromorphic deutonymphs (one host from Ontario, Canada, 21 from

[1] This research was supported in part by grant No. AI 05483-01 from the National Institutes of Health, U. S. Public Health Service. Appreciation is expressed to Dr. W. T. Atyeo of University of Nebraska for aid in identification and to Dr. A. M. Fallis and Dr. C. Herman for research facilities at the Ontario Research Foundation and Patuxent Wildlife Research Center.



Figs. 1–6. Heteromorphic deutonymph, *Gabucinia alcyon*, n. sp. Figs. 1–4 First stage deutonymph. Fig. 1, Ventrodorsal view, fig. 2, Tarsus and segment 5 of leg I; fig. 3A, Anterior portion of right side, ventral view; fig. 3B, Posterior portion of right side, ventral view; fig. 4A, Anterior portion body, side view; fig. 4B, Posterior portion body, side view. Figs. 5, 6, Third, mature, stage of deutonymph. Fig. 5, Ventrodorsal view; fig. 6A, Anterior portion right side, ventral view, same magnification as fig. 1; fig. 6B, Posterior portion—same as 6A.

Massachusetts, U.S.A.). They represent three distinct stages of maturity and were obtained in two ways: by detergent washings of the skin and of the carcass, and by examination of the inner surface of the upper eyelid. Using the detergent technique, 6 of the 22 hosts were found to harbor first stage, and the remaining 16 third stage (mature) deutonymphs. The eyes of 5 of the birds in the latter group were examined and all three stages of deutonymph development were present. The deutonymph of the green heron was obtained in one out of 23 birds from Massachusetts. Only three specimens, mature forms, were collected; they were found in the adipose tissue of the axilla and the groin.

Gabucinia alcyon, n. sp.

(Figs. 1–6)

Stage 1: (Figs. 1–4). Body transparent, cylindrical to oval, 280 μ by 130 μ (range 240–336 μ by 112–160 μ); depth 100 μ; ratio width to length 1 : 2.09.

Dorsum (Fig. 1). Setae 13 pairs—one mid-terminal anteriorly, 15 μ long; two pairs level coxae I (inner minute; outer 50 μ); four pairs between coxae II, III (three in a straight line, the outermost the longest, 23 μ); 6 pairs in genito-anal level (one median, four postero-lateral, one terminal). Sclerotized areas lacking. Dorsal septum beginning to form in approximately half the specimens as a small median demarcation, 15 μ long, just posterior to level of coxae II.

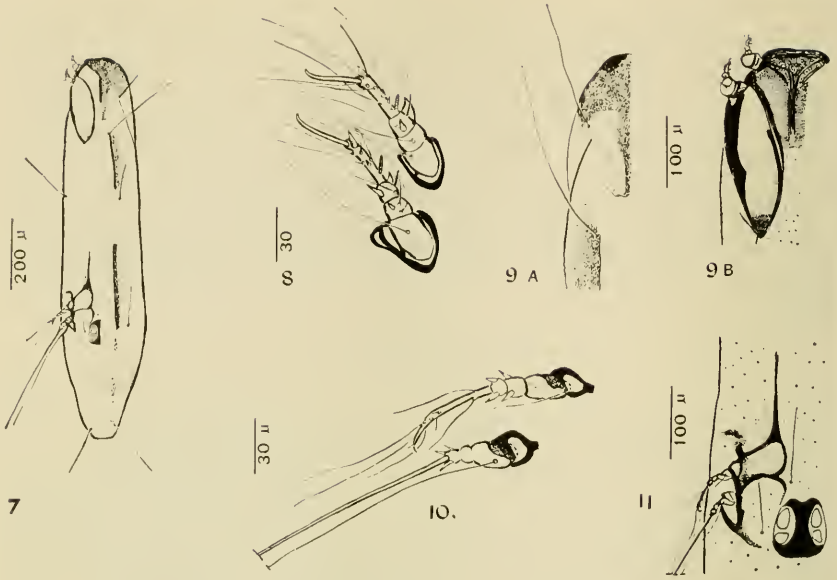
Venter (Figs. 1, 3, 4). Setae 5 pairs—one palpal, 23 μ, in a groove; one lateral, halfway between coxae II and III, 38 μ; two genital 22 μ and 37 μ long; one posterior, 8 μ. Palpal rudiment visible. Genital region consists of a central bar and two pairs of plates. The bar is 46 μ long, slightly bifid at each end; anterior and posterior plates measure 16 by 16 μ and 18 by 15 μ. The two plates of each side are bordered laterally by a crescentic chitinous bar. Anus, a longitudinal slit, 10 μ from genital region and 22 μ from posterior end body.

Leg I (Figs. 2, 3A, 4A): 60 μ, strongly chitinized. Anterior epimeron free, posterior epimeron fuses with anterior epimeron of leg II; coxa open, 46 μ. Segment two, one minute claw-like seta on ventral border; segment three, one seta postero-ventral; segment four, one anterior bristle and one dorsal seta; segment five, two anterior setae (one dorsal, one ventral) and one postero-dorsal spine. *Tarsus* (Fig. 2): one proximal anterior sensory seta, 10 μ, slightly swollen distally, three short setae, and distally, one dorsal anterior bristle, one posterior long seta with thick base, 90 μ in length; 5 terminal processes—anterior spine, two setae at its base, one posterior claw, 30 μ, and one seta at its base.

Leg II (Figs. 3A, 4A): Similar to leg I except tarsus, which has a tapering sensory seta, bristle short, and only one seta, not two, at the base of the terminal spine, otherwise like tarsus I.

Leg III (Figs. 1, 3B, 4B): 60 μ; epimeron curves anteriorly, free; coxa open. Segment two, one anterior spine and one ventral seta; segment three lacks setae; segment four, one anterior and one dorsal spine; segment five, one anterior and one dorsal spine. *Tarsus*, two spines along its stem (one anterior, one dorsal); one terminal spine with a tiny seta at its base, one long posterior seta, 77 μ, and a more delicate, dorsal seta.

Leg IV (Figs. 1, 3B, 4B): Epimeron short projecting anteriorly, parallel with



Figs. 7–11, Heteromorphic deutonymph of *Ardeacarus americanus*, n. sp. Fig. 7, Ventrodorsal view; fig. 8, Legs I and II, segment three to tarsus; fig. 9A, Anterior portion left side, dorsal view; fig. 9B, Anterior portion right side, ventral view; fig. 10, Legs III and IV, omitting coxae; fig. 11, Posterior coxae and genital region, right side, ventral view.

that of leg III. Segment two, one anterior spine; segment three, one ventral seta; segment four, no setae; segment five, one anterior, and one dorsal spine. *Tarsus* terminates in one anterior spine and one long seta, 173 μ, and along its stem two spines (one anterior and one dorsal).

Stage 2: Length 590 μ, width 240 μ, depth 208 μ (range 448–616 μ length; 260–300 μ width). Distance between anterior end and leg II increased only from 73 μ to 108 μ; whereas distance between legs II and III increased from 184 μ to 540 μ, thus greatest growth is in the middle and posterior regions of body—distance between posterior boundary of genital region and posterior end body has increased from 88 μ to 199 μ. Dorsal septum present and varies in length from 201 μ to 243 μ (i.e. almost complete). Sclerotization of the body has begun especially dorsally and along anterior end of body. The anterior edge is heavily sclerotized and a supporting bar is growing in from the sides, thin at first and incomplete. Epimera I approach the mid-line; sternum is developing independently; all three are approaching each other. All epimera are thickening and elongating. Epimera I and II fused together; those of leg II are approaching each other indicating closure of coxae II. Epimeral lengths of legs I to IV in some specimens reach lengths of 96, 127, 173, 96 and 108 μ respectively.

Stage 3 (Figs. 5, 6): 800 μ by 300 μ with a depth of 224 μ (range 720–816 μ by 272–400 μ). Dorsal septum complete. Sclerotization complete on dorsum, heavy along anterior edge, light just posterior to dorsal septum. Ventrally, the anterior

region between epimera I is heavily sclerotized, especially the anterior rim, which is supported by a bar. Other sclerotized areas include coxae I, II and III and all the region from coxae IV and genital plates to posterior end; a slight sclerotized flange runs forward from coxa III of each side for half the body length; a sclerotized patch runs back of leg IV; two clear areas, one on coxa I and the other on coxa III, are visible and are probably precursors of setae. Distance between legs II and III range from 502 to 596 μ. Epimera I are fused to sternum and are 115 μ in length. Epimera of leg II are 127 and 293 μ long and approximate each other; epimera of legs III and IV are now 100–119 μ.

The holotype is a mature specimen and has been deposited in the U.S. National Museum as No. 3165 along with paratypes representing all three stages in deutonymph development.

Ardeacarus americanus, n. sp.

(Figs. 7–11)

Body cylindrical, opaque yellowish-white. 1.12 mm by 0.24 mm; ratio width to length 1:4.7.

Dorsum (Figs. 7, 9A): Setae 6 pairs relatively short—two in anterior quarter (the inner more posterior and longer), one medio-lateral in anterior two thirds of body; one medio-lateral at level of genital plates; two postero-median. Five sclerotized regions; the first, 134 μ long, extending from anterior end to coxae I; two pairs medio-lateral longitudinal strips in anterior and posterior halves of body.

Venter (Figs. 7, 9B, 11): Setae four pairs—one lateral in middle third of body; two pairs of small genital and one posterior pair. Genital region heavily sclerotized, 270 μ from posterior end, measures 84 by 77 μ and encloses two plates on each side. Anus not visible.

Leg I (Fig. 8): 80 μ long, heavily sclerotized proximal segments. Epimeron I fused with sclerotized anterior region so that coxa I is 110 μ long; posterior epimeron fuse with epimeron of leg II. Segments three and four each with one seta. Segment 5 with one bristle and a large spine on anterior edge, a dorsal (outer) spine and one seta.

Tarsus elongate ending in a claw and a spine; processes from proximal to distal end consist of one anteriorly directed sensory, one small spine, 6 setae and one bristle at the base of the terminal spine.

Leg II (Fig. 8): 80 μ long. Coxa sclerotized and complete, 110 μ by 75 μ, posterior end 270 μ from anterior end. Segment three with one seta; segment four two setae (one dorsal, one ventral) and a dorsal spine. Segment 5, one anterior spine and bristle, one dorsal spine and seta. *Tarsus* terminates in a claw and a spine; along its stem occur one sensory seta, one small spine and four setae. Distance between emergence of legs II and III 640 μ.

Leg III (Fig. 10): 100 μ long. Epimeron extends anteriorly for 120 μ; coxa closed, 45 μ by 41 μ. Segment two, one seta, segment three, one dorsal spine; segment four and 5, one anterior and one dorsal spine each. *Tarsus* long and narrow, 60 μ, terminating in a small spine-like claw, and bearing 6 setae and two small bristles.

Leg IV: 46 μ; coxa incomplete, 320 μ from posterior end. Segment three, one long seta, 330 μ; segment four, no setae; segment five, two anterior and one dorsal spine terminating in one long stout seta, 330 μ long.

The holotype has been deposited in the U.S. National Museum as No. 3166.

Remarks: The deutonymph from the green heron is a species of the genus *Ardeacarus* (tribe—Pterolichini), and is a close relative of *A. ardeae* (Dubinin, '56), which parasitizes herons in the Old World. This identification is based on two factors: the comparison of their deutonymphs, and the presence in the green heron of adult *Ardeacarus* sp. on the wing feathers.

Both deutonymphs possess four basic features in common: the legs, and the anterior coxae and sternal regions have the same pattern; the 5 dorsal plates are similarly arranged and the ratio of width to body length is 1 : 4. The major differences between the two lie in the number and position of the ventral setae and in the nature of the posterior coxae and genital area. In *A. ardeae,* there are two pairs of long lateral setae (not one) as well as the posterior pair and no genital setae; the anterior extension of coxa III is lacking; coxae IV unite medially enclosing the genital plates, and the median part of the genital region is not strongly sclerotized. A minor difference is the presence of three sclerotized spots for muscle attachment on the anterior coxa-sternal region. The dorsal setae of *A. ardeae* have not been illustrated, nor is there any detailed description of the legs. It is difficult in the diagrams of the legs to recognize the spines so characteristic of those legs of the green heron deutonymph.

Eight of the 23 green herons harbored *Ardeacarus* sp. on the feathers of the wing. All stages (eggs, nymphs and adults) were readily observed, and the host with the heaviest population of adults was also the one from which the deutonymphs were collected. *Ardeacarus* sp. has not been previously reported from *Butorides v. virescens.*

In comparison with the above pterolichin deutonymphs, the American kingfisher mite is not a member of this tribe but possibly of the Pseudalloptini, to which *Coraciacarus alcedinis* (host, Old World kingfisher) and species of *Gabucinia* (hosts, owls, hawks belong (Dubinin '53). All these deutonymphs possess three characteristics in common; ratio body width to length 1 : 2; 2 pairs dorsal setae at level of coxa I, of which the inner is minute, and a similar pattern to the anterior coxa-sternal region. The deutonymph of *C. alcedinis* differs from the American kingfisher mite in several respects. These include the venter setae (one on coxa I only one genital, and no lateral or posterior setae); closed coxa III and its configuration with the genital plates. The claw of tarsus I and tarsus II do not show in the diagram. The American kingfisher deutonymph may be a species of *Gabucinia*, for it shares many features in common with this species. All have coxae III and IV incomplete, distinctly separate from the genital area, which exhibits the same basic pattern throughout. It appears closest to

G. nisi from the sparrow hawk and goshawk since both possess two genital setae and a simple arrangement of the genital plates. However, the adult feather mites collected from the wing feathers, along with the egg and nymphal stages, have been identified by Dr. Atyeo as *Pterodectes* sp. (Proctophyllodidae). They occurred in 18 hosts, often in abundance. Of the 18 birds 11 also harbored these deutonymphs. Yet, heteromorphic feather mite deutonymphs are characteristic of the family Pterolichidae! It would be unusual to repeatedly find only deutonymphs of a species in a host and no adults, therefore it is likely that they actually represent the dormant stage of *Pterodectes* sp. and do not belong to the genus *Gabucinia* despite their morphological resemblance to its members. Feather mites have not been reported in the literature from the American Kingfisher.

The growth changes which the young deutonymph undergoes, once it settles in the adipose tissue following its migration and penetration, before reaching its dormant hypermorphic condition are described in detail for *Ardeacarus ardeae* (Can.) by Dubinin ('56). These changes, in the main, parallel those observed between stages I and III in the deutonymph of the Kingfisher mite. They are the result of endosmotic nutrition and include extensive body growths, especially the coxal fields and middle regions, although ratio of width to body length remains virtually the same; elaboration of the anterior coxa-sternal area and sclerotization of the body. The absolute size of the setae and of the legs (except for coxae) remains unchanged. Unlike *A. ardeae* the elaboration of the anterior coxa-sternal area is slight and the posterior coxae and genital regions undergo no further differentiation.

In stage II, epimera I approximate each other as the primordium of the sternum becomes visible, but their actual fusion does not occur until stage III. Sclerotization first appears at stage II. A fourth sign of differentiation is present in the deutonymph of the kingfisher mite, namely the establishment of a dorsal septum. This is barely perceptible, if at all, in specimens of stage I but is better defined at stage II and completed by stage III.

The deutonymph from the green heron has reached the dormant mature stage, for the size of the body is proportionately far greater than the dimensions of the setae and legs; the pattern of the anterior coxa-sternal and posterior coxa-genital regions is well advanced, as is the sclerotization of the body.

The structure of the legs of the deutonymphs is of interest, for each is strongly sclerotized and equipped with numerous spines which are either terminal or arise from the anterior or dorsal surfaces. The tarsus of each of the anterior legs in both species possesses a sensory seta and a terminal claw, and leg IV ends in a long stout stilt-like seta.

These processes undoubtedly play an important role in the migration of the deutonymph to its final destination in the host.

The distribution of heteromorphic deutonymphs has been illustrated for four hosts by Dubinin ('51). In the pigeon, they congregate in the connective tissue of the large blood vessels of the neck, occasionally also in the axilla. They aggregate in the subcutaneous adipose tissue of the heron in the region of the coracoid and the sternum (along its posterior border and on each side of the keel). A few may sometimes be found in the connective tissue of the neck blood vessels, the trachea, the lungs and between the muscle bundles of the neck and chest. This distribution holds true for those parasitizing the Old World kingfisher and the hawks; in the latter group of birds they also occur in the axilla. Grünberg and Kutzer ('62a) diagrammed the position of the deutonymphs in the white-headed ibis—the connective tissue of the axilla and groin, between the thigh muscles, and a few in the region of the cloaca and breast. In the green heron, the author collected them from the axilla and the groin. Spurlock and Emlen ('42) reported their presence in the red-shafted flicker in the connective tissue of the trachea, extending from the tongue to the lungs. The location of the deutonymphs of the kingfisher was only discovered through cutting the upper eyelid free from the rest of the skin and bringing it forward in order to examine its anterior inner surface. The deutonymphs, representing all three stages, occurred massed together in the connective tissue, where the nictitating membrane arises at the anterior end of the orbit. When the mites were observed in the one eyelid, the other also proved positive for them. It should be noted that in birds the lower eyelid is the mobile one; thus, the upper eyelid forms a relatively undisturbed, and thus favorable site for this dormant stage of the mite. They were never found on the nictitating membrane, in the orbit or on the inner surface of the body skin. In heavy infestations, they had often spread to the inner surface of the lower eyelid, along the jaws, tongue, esophagus and trachea.

Of the 6 hosts where only young deutonymphs were collected from detergent washings, the eyelids of 5 thoroughly examined and proved negative for mites. It is assumed that these stage I deutonymphs were in the process of migrating from the wing to their final destination in the connective tissue of the upper eyelid.

It has been postulated that the young deutonymph reaches its subdermal site either through the feather follicles or through the respiratory organs (Spurlock and Emlen, '42). Recently Grünberg and Kutzer ('62a) have offered evidence to the effect that the protonymph crawls out through the superior umbilicus, and molts into the deutonymph on the adjacent skin region. Then the young deutonymph migrates through the split, which arises between the feather sheath

and the skin prior to molting, into the hypodermis. In the American kingfisher, however, its deutonymph may reach its dormant site in the upper eyelid directly, irrespective of the plumage or respiratory organs and independent of the molting season.

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NEW COLEOPTERA RECORDS FROM NORTH CAROLINA

While collecting Coleoptera by means of a modified Berlese funnel, I found the following three species representing families or subfamilies not previously recorded from North Carolina. The determinations were verified respectively by Dr. H. S. Dybas of the Chicago Natural History Museum, Mr. H. R. Steeves, Jr. of Birmingham, Alabama, and Dr. John Kingsolver of the U. S. National Museum. The specimens are deposited in my own collection and that of the Entomology Department of N. C. State University, Raleigh, N. C.

Limulodidae: *Limulodes paradoxus* Matthews. Eight specimens from nest of a small yellow *Lasius* ant, probably *L. umbratus mixtus* Nyll. Raleigh, Wake County, N. C., 8 Sept. 1964. J. F. Cornell.

Pselaphidae (Clavigerinae): *Adranes coccus* LeConte. One male, 3 females from nest of a small yellow *Lasius* ant, probably *L. umbratus mixtus* Nyll. Raleigh, Wake County, N. C., 8 Sept. 1964, J. F. Cornell.

Sphindidae: *Sphindus americanus* LeConte. Fourteen specimens, from pine and oak logs with *Polyporus* fungi on the bark. 6 miles N. of Salemburg, on N. C. 242 Sampson County, N. C., 2 May 1964. J. F. Cornell and C. D. Mampe.—J. F. Cornell, *Dept. of Entomology, Oregon State University, Corvallis, Oregon 97331*

LACE BUGS OF THE GALÁPAGOS ARCHIPELAGO
(HEMIPTERA: TINGIDAE)[1]

CARL J. DRAKE *and* RICHARD C. FROESCHNER[2]

Butler (1877) described the first lace bug from the Galápagos Islands as *Monanthia cytharina* from a single specimen collected by Charles Darwin on "James Island," now officially named Isla San Salvador. Barber (1925) followed with *Corythaica renormata* from Daphne Major, but later (1934) synonymized his species with *cytharina* which he transferred to *Corythaica*.

The present paper characterizes three additional species, two in the genus *Corythaica* (subfamily Tinginae) and one in the genus *Phatnoma* (subfamily Cantacaderinae). The total of lace bugs for the Islands now is four species in two genera.

Specimens on which this report is based were collected by members of the "Galápagos International Expedition," supported in part by National Science Foundation grant GE-2370 to the University of California, Berkeley, California. They were made available for study by the kind efforts of Dr. Paul H. Arnaud, California Academy of Sciences, San Francisco, California; Dr. Peter D. Ashlock, Bernice P. Bishop Museum, Honolulu, Hawaii; and Dr. Robert L. Usinger, University of California, Berkeley, California. The illustrations, by E. Herbold Froeschner, were made with the appreciated aid of National Science Foundation Grant GB 791(201).

KEY TO GENERA OF TINGIDAE KNOWN TO OCCUR ON THE GALÁPAGOS ISLANDS

1. Pronotum anteriorly with a large, inflated cyst projecting over and beyond head; posterior margin of pronotum produced rearward as a long, acutely angled process. (Figs. 2–4) ..... **Corythaica**

   Pronotum anteriorly without an inflated cyst, head visible from above; posterior margin of pronotum truncated, not projecting rearward. (Fig. 1) ..... **Phatnoma**

Genus **Phatnoma** Fieber 1844:57

This genus is reported from Africa, southeastern Asia, Australia and the islands of the southern Pacific Ocean in the Old World and from Central and South America and the West Indies in the New World. The species described below is the first member of the genus and of the subfamily from the Galápagos Archipelago.

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[1] Contribution No. 47 of the Charles Darwin Foundation for the Galápagos.

[2] *Department of Entomology Smithsonian Institution.* At the time of his death, the senior author had completed a manuscript on this material and had used this title. However, review of the manuscript revealed a number of errors apparently resulting from a rapid decline of health. Because many new decisions importantly changed the paper, it was decided the reviewer should take partial responsibility as coauthor.

Phatnoma eremaea, n. sp.
(Fig. 1)

Small, brownish testaceous with head, appendages, pronotal disc, (except black calli) and numerous areolets on elytra brownish to fuscous; body beneath brown with laminae of sternal sulcus testaceous. Femora brown, tibiae yellowish brown. Antenna yellowish brown, last segment darkened. Length 2.5 mm., width 1.2 mm.

Head very long, greatly extended in front of eyes, armed with seven long spines: occipital pair appressed, very long, surpassing eyes by half of their lengths, frontal pair shortest; antennal tubercles long, spinelike, sharp, horizontal, divergent. Antenna long, slender, segments I and II very short, moniliform, measurements in millimeters: segments I, 0.10; II, 0.07; III, 0.90; IV, 0.18. Bucculae wide, areolate, ventral margin strongly emarginate preapically, ends meeting anteriorly. Labium long, brownish, apex reaching beyond thoracic sternum in repose; laminae of sternal sulcus uniseriate, parallel, open behind.

Pronotum moderately convex, punctate, tricarinate; lateral carinae farther apart medially than at ends, not clearly areolate, slightly less elevated than median carina, ending in front at middle of calli; collum wide, not much elevated, concave on fore margin, with two to three transverse series of areolets; paranotum moderately wide, flared anteriorly, slightly reflexed, four areolae in widest part, two wide in front, armed with a long spine at antero-lateral angle; hind margin very short, truncate, not extended rearward over scutellum and elytral clavi.

Elytra together in repose, elliptical, wider and longer than abdomen, with fuscous marks located as depicted in illustration; scutellum small, exposed; clavi, taken together, triangular, median length equal to basal width; costal area three areolae wide, areolae larger than those in other areas, adventitious veins as seen in illustration; subcostal area mostly four areolae wide, sloping sharply downwards; discoidal area longitudinally impressed, about three-fourths as long as elytron, six areolae wide in widest part, acutely angulate at base and apex; sutural areas small, overlapping in repose. Hind wings densely smoky, almost as long as elytra.

Holotype, macropterous ♂: Galápagos Archipelago, Bella Vista, Isla Santa Cruz, elev. 220 m., Jan. 28, 1964, G. Kuschel. (California Acad. Sci.).

Paratype: 1 specimen, macropterous ♂, Isla Santa Cruz, Horneman Ranch, Feb. 16, 1964, D. Q. Cavagnaro and R. O. Schuster (Drake Collection, USNM).

This is the first species of the subfamily Cantacaderinae Stål from the Galápagos Islands. It differs from South American members of *Phatnoma* in having an overall narrower form, and the costal area uniformly expanded, and mostly triseriate.

Genus **Corythaica** Stål 1873:120, 128

The thirteen known species of this wholly American genus were monographed by Mrs. Hurd (1945) who recorded only *cytharina* from the Galápagos Archipelago. Three species are now known to occur on those islands.

KEY TO THE SPECIES OF **Corythaica** KNOWN TO OCCUR ON GALÁPAGOS ISLANDS

1. Paranota, viewed from above, appearing distinctly and roundingly emarginate on anterior half (Figs. 2 and 3); dorsum variously marked with fuscous 2
   Paranota, viewed from above, not appearing emarginate on anterior half (Fig. 4); dorsum milky white with no fuscous markings, except sometimes on veins ..... **darwiniana,** n. sp.
2. Anterior half of pronotal hood tumidly swollen similarly to basal half, scarcely narrowing almost to blunt apex (Fig. 3); lateral carinae not more than one-third as high as median carina ..... **wolfiana,** n. sp.
   Anterior half of pronotal hood compressed, not tumidly swollen, gradually tapering to very acute apex (Fig. 2); lateral carinae two-thirds to fully as high as median carina ..... **cytharina** (Butler)

Corythaica cytharina (Butler)
(Fig. 2)

Monanthia cytharina Butler 1877, p. 9.
Leptostyla cytharina: Distant 1902, p. 345.—Champion 1924, p. 260.
Corythaica renormata Barber 1925, p. 286.
Corythaica cytharina: Barber 1934, p. 286.—Monte 1941, p. 88—Hurd 1945, pp. 82, 86.—Drake and Ruhoff 1965, p. 138.

All previous listings of this species (cited above) plus the material at hand show it to be restricted to the Galápagos Archipelago where it occurs on seven of the islands. As is evident from the records given below, this is the commonest and most widespread lace bug in the Archipelago, but it does not range onto the northernmost islands. The number of associations with plants as given on the labels indicate its taste to be rather wide: *Lycopersicon* (tomato), Solanaceae; *Portulaca*, Rubiaceae; *Scalesia*, Compositae; *Sida*, Malvaceae. Its occurrence on cultivated tomatoes in some numbers (on Santa Cruz) suggests that at times it might be a pest.

Accurate placement of the species was made possible by notes from Mr. James A. Grant who compared some of these specimens with the type in the British Museum (Natural History), and by the kind cooperation of Drs. Pedro Wygodzinsky and Robert L. Usinger who made it possible to study the type of *renormata* which belongs to the American Museum of Natural History.

The series of specimens shows considerable variation in color intensity and in number of rows of cells in the costal area of the front wing. Besides the uniseriate condition of the costa shown in the illustration (Fig. 2) one or both sides may have a few triangular, intercalary cells, or even one or more cells divided by a longitudinal vein into an outer and an inner part; when a contiguous series of cells is so divided the costal area appears to have two or more rows of cells in the region involved. This splitting of the cells, as seen in the series studied,

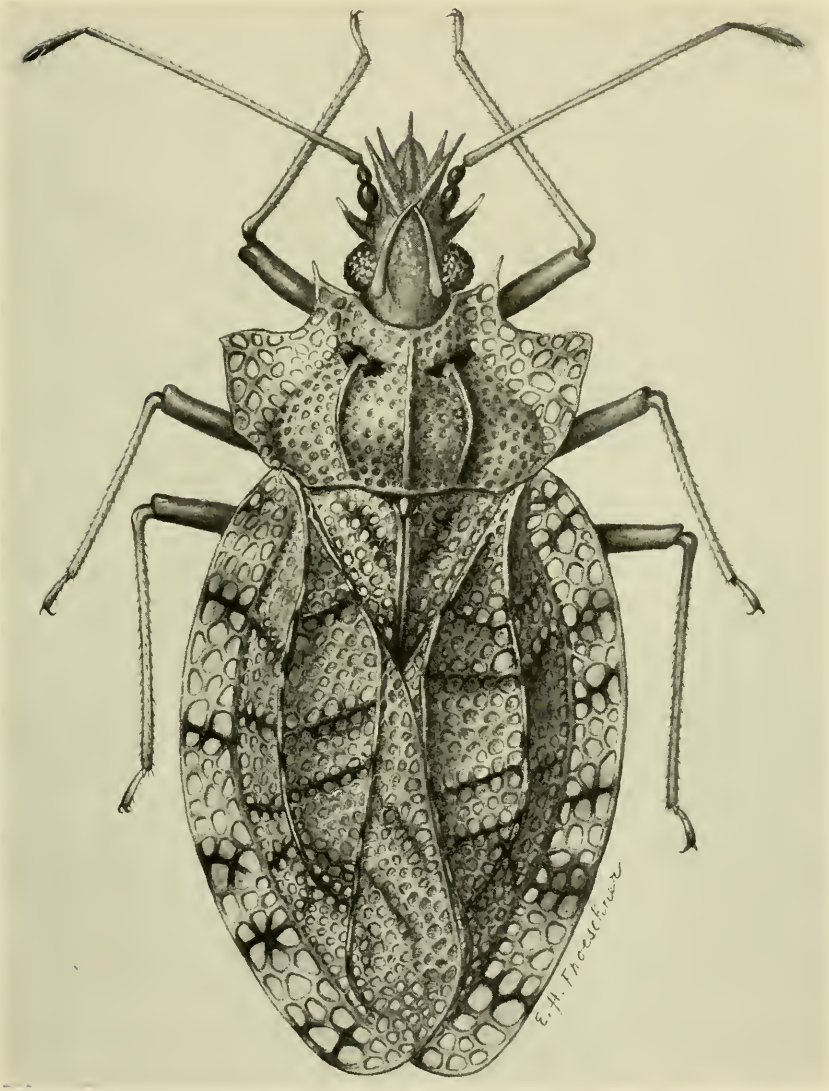

Fig. 1. *Phatnoma eramaca,* n. sp.

happens most commonly in the basal half of the costal area opposite the discal area and to a lesser degree on the paranota. The old and new records listed herewith are given by the official Ecuadorian names of the islands:

DAPHNE MAJOR: Barber, 1925.

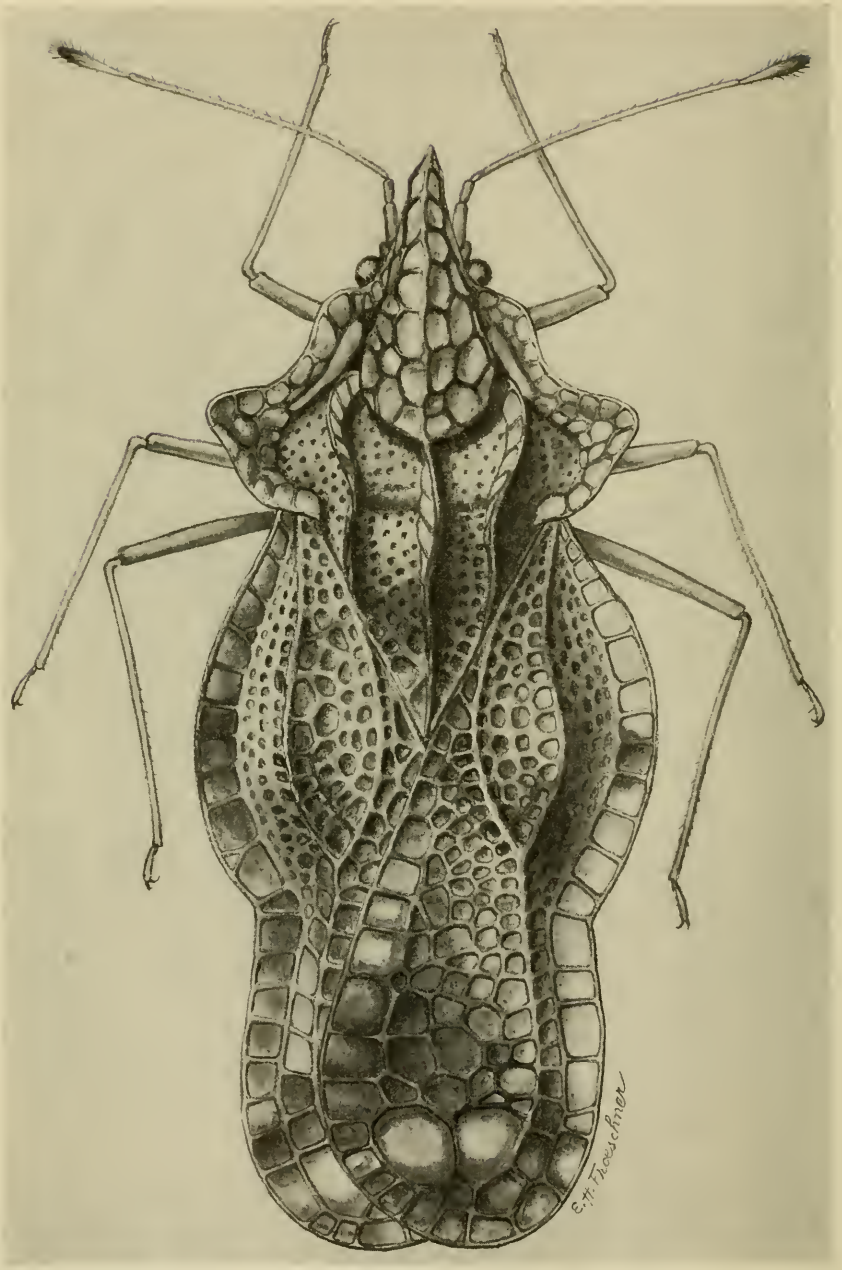

Fig. 2. *Corythaica cytharina* (Butler).

FERNANDINA: west side, 1,100 feet, May 2, 1964, D. Q. Cavagnaro, 2 specimens.

ISABELA: Tagus Cove, January 30, 1964, R. L. Usinger, *Scalesia gummifera*, 1 specimen.

PINZON: Duncan, February 7, 1964, P. D. Ashlock, 15 specimens; Summit and Upper Caldra areas, February 7, 1964, D. Q. Cavagnaro, 3 specimens.

SAN SALVADOR: "James Island," Butler, 1877.

SANTA CRUZ: Academy Bay, Darwin Research Station Trail, January 23, 1964, P. D. Ashlock cultivated tomatoes and *Scalesia affinis*, 47 specimens; February 11, 1964, P. D. Ashlock, *Portulaca* species, 8 specimens; same locality and date, R. L. Usinger, 2 specimens. Bella Vista, 220 meters, January 23, 1964, G. Kuschel, three specimens; February 4, 1964, R. L. Usinger, *Sida rhombifolia*, 10 specimens. E. slope, 160 meters, April 16, 1964, D. Q. Cavagnaro, 11 specimens. Horneman Farm, 220 meters, April 2, 1964, D. Q. Cavagnaro, 1 specimen. Table Mountain, 440 meters, April 16, 1964, D. Q. Cavagnaro, 1 specimen.

SANTA MARIA: Witmer's Farm, February 2, 1964, R. L. Usinger, 1 specimen.

Corythaica wolfiana, n. sp.

(Fig. 3)

Large, broad, testaceous with pronotum, upper half of hood, large part of median carina, discoidal and sutural areas, various marks on costal areas and paranota fuscous to dark fuscous; body beneath with abdomen black, pronotal sternum dark brown, and genital segments reddish brown. Legs and antennae testaceous. Rostrum brown with tip blackish and resting on base of mesosternum. Hind wings with apices surpassing apex of abdomen, deeply infuscate. Length 2.5 mm., width, 1.3 mm.

Head very short, concealed by overhanging pronotal hood, eyes visible from above, cephalic spines reduced. Bucculae areolate, continguous in front. Antenna slender, sparsely pubescent, fourth segment subclavate, measurements in millimeters: segments I, 0.15; II, 0.10; III, 0.67; IV, 0.25.

Pronotum moderately convex, coarsely punctate, tricarinate; hind margin trigonal and areolate; hood long, highest near midlength; median carina longer than hood (60:52), upper margin deeply bisinuate, highest in front of middle, at crest slightly higher than hood; lateral carinae about half as high as median carina, arcuately diverging on anterior half, the areolae fairly large and uniseriate. Paranota wide, slightly reflexed, broadest just anterior to humeral angles, there four areolae wide, narrower in front. Basal folds of paranotum (subapically along inner margin) fairly long, narrow, each nearly rectangular in outline.

Elytra much wider and longer than abdomen, distinctly concave on sides beyond middle, forepart of costal area wide, mostly biseriate, areolets fairly large; subcostal area wide, sloping sharply downward, much narrowed behind discoidal area, areolae small, mostly five cells deep; discoidal area nearly reaching middle of elytron, narrowed at base and apex, four aerolae wide at middle; boundary vein separating subcostal and discoidal areas sharply elevated, tectate, with small

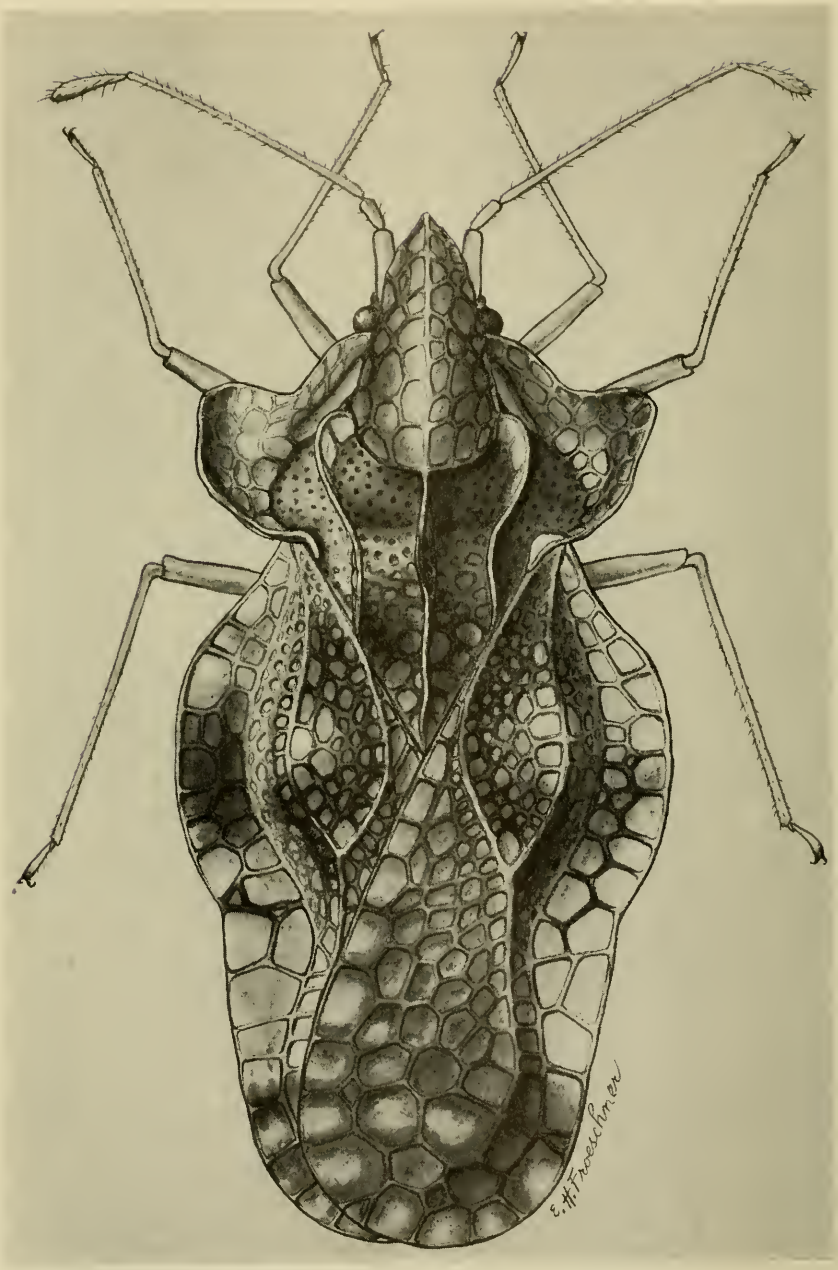

Fig. 3. *Corythaica wolfiana*, n. sp.

rounded elevation behind middle of outer boundary veins; boundary vein separating discoidal area from sutural area distinctly though slightly raised; sutural areas composed of moderately large areolae, overlapping at rest; hypocostal ridge narrow, uniseriate.

Holotype ♂ and allotype ♀: Galápagos Archipelago, Isla Wolf, February 1, 1964, on *Scalesia* species, D. Q. Cavagnaro (California Acad. Sci.). *Paratypes*: 35 specimens with same data label as holotype (collections California Acad. Sci., Bernice P. Bishop Mus., Drake Coll. in USNM, R. L. Usinger). The specific name reflects the apparent restriction of the species to Isla Wolf.

In Mrs. Hurd's (1945) key to the species of this genus, the present form runs readily to *costatus* Gibson and at first the inclination to call it that was very strong. Comparison with the type of *costata* in the United States National Museum and the series of specimens in the Drake Collection (also USNM) arranged by Mrs. Hurd shows both species to differ from *cytharina* by the median carina being much higher than the lateral carinae. The two species *costata* and *wolfiana* can be separated from each other by the following couplet:

1. Dorsal outline of median carina distinctly higher than that of pronotal hood; paranotal width at broadest point approximately half the width across pronotal disc between humeri ..... **costata** Gibson

   Dorsal outline of median carina distinctly lower than that of pronotal hood; paranotal width at widest point about one-third the width of pronotal disc between humeri ..... **wolfiana**, n. sp.

The species appears restricted to the second northernmost island of the Archipelago. Host records associated with specimens show this species to frequent the plant genus *Scalesia*.

Corythaica darwiniana, n. sp.
(Fig. 4)

Moderately large, broad, whitish, pronotal disc brown; with a few scattered veinlets and at time also those in apical fifth of elytra brownish; arcolae largely milky white; bucculae brown with inferior margin testaceous; body beneath blackish, slightly shiny, male genital segment reddish brown; rostrum brown, its apex touching metasternum; sulcal laminae testaceous, with V-shaped opening at base. Length 2.60 mm., width (basal part of elytra) 1.28 mm., (apical part) 1.00 mm.

Head very short, black, concealed by evenly arched pronotal hood, eyes visible from above, cephalic spines short. Antenna long, slender, inconspicuously pubescent, measurements in millimeters: segments I, 0.15; II, 0.10; III, 0.70; IV, 0.25. Bucculae contiguous in front.

Pronotum moderately convex, coarsely punctate, tricarinate; median carina slightly longer than hood (65:60), considerably elevated, upper margin obtusely arched, at summit subequal to or higher than hood, mostly biseriate; lateral carinae nearly straight, each composed of a single row of nearly quadrate areolae, ending anteriorly at callus. Paranotum wide, slightly reflexed, widest slightly anterior to humeral angles, there four areolae deep, narrowed anteriorly. Hind

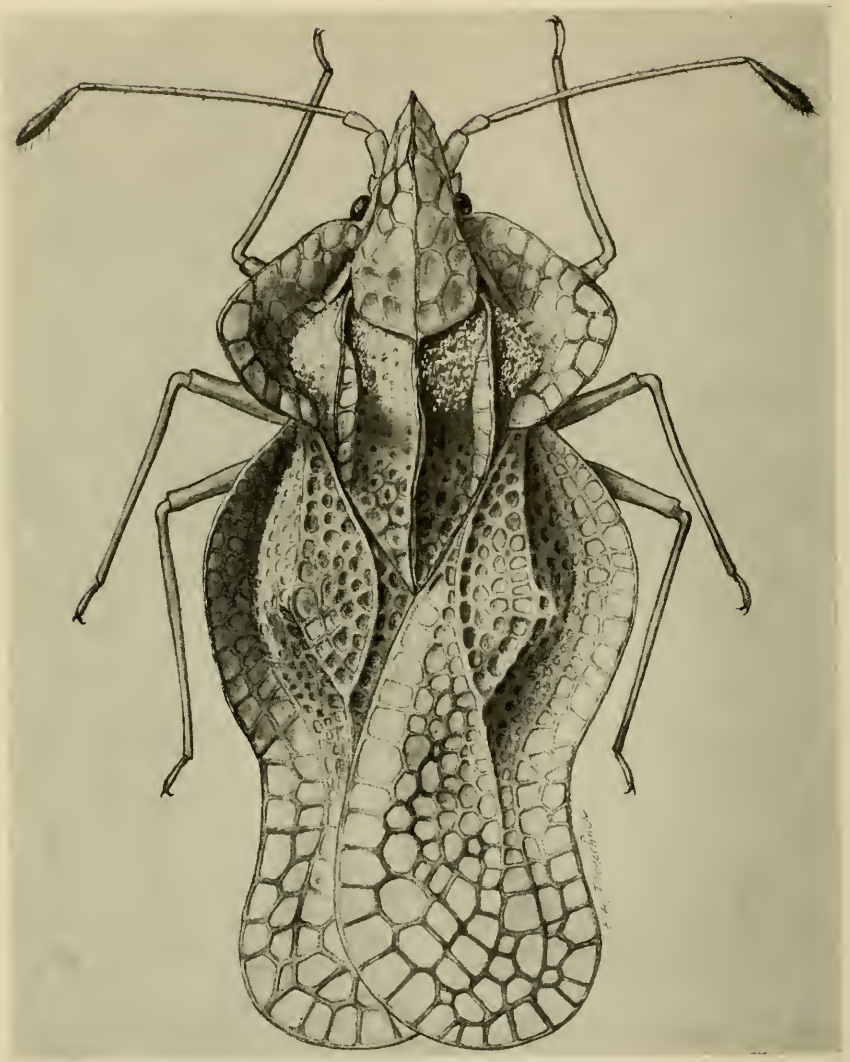

Fig. 4. *Corythaica darwiniana*, n. sp.

margin of pronotum triangular, areolate. Basal folds of paranotum (subapically near inner margin) conspicuous, each nearly rectangular in shape.

Elytra much wider and longer than abdomen, deeply coarctate behind middle, apical part much narrower than forepart; costal area wide, rather regularly biseriate, areolae large; subcostal area four areolae deep opposite discoidal area, thence narrowing posteriorly into a single row of large areolae; discoidal area acutely angulate at each end, widest near apical third, there four areolae wide, boundary vein separating it from subcostal area sharply raised, tectate, and with

a small tumid elevation at highest point, boundary vein separating it from sutural area distinctly though slightly elevated; sutural areas slightly overlapping each other within, apices separated in repose, the areolae large. Hypocostal ridge narrow, uniseriate. Hind wings brownish, slightly surpassing apex of genital segments.

Holotype ♂ and *Allotype* ♀: Galápagos Archipelago, Isla Darwin, January 29, 1964, P. D. Ashlock, *Alternanthera* species (California Acad. Sci.). *Paratypes*: Same information as holotype, 26 specimens; same date and locality as holotype, D. Q. Cavagnaro, 12 specimens (in collections Bernice P. Bishop Mus., California Acad. Sci., Drake Coll. in USNM; R. L. Usinger). The specific name signals the species' restriction to the northernmost island of the Archipelago, Isla Darwin.

In Mrs. Hurd's (1945) key to the species of *Corythaica*, this new one runs readily to *cucullatus* (Berg). It is separable therefrom by the following couplet:

1. Lateral carinae of pronotal disc strongly diverging on anterior half; median carinae on posterior half uniseriate and with dorsal margin broadly and strongly concave ..... **cucullata** (Berg)
   Lateral carinae of pronotal disc subparallel, not diverging on anterior half; median carinae biseriate for virtually full length, its dorsal margin not concave ..... **darwiniana**, n. sp.

Alternanthera species appears to be the host for this insect as so many specimens were collected from it.

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A NOTE ON CEROPALES MACULATA FRATERNA SMITH IN WISCONSIN

(HYMENOPTERA: POMPILIDAE)[1]

This species was obtained from a sumac trap nest that had been hung on the wall of an abandoned farm house in Waushara County on July 29, 1959. The nest, which was collected on October 1, contained cocoons in each of four cells. The innermost cells 1 and 2 were in loose pith in the butt end of the trap. They were partitioned off from outermost cells 3 and 4 at a depth of 4 3/4 inches from the orifice. Cells 3 and 4 were constructed in loose pith also, and had been partitioned off at 2 inches from the orifice. The remained of the 1/4-inch diameter boring was plugged with small bits of trash in a manner characteristic of some nests of *Dipogon sayi* Banks.

The contents of the four cells were reared in the laboratory. Cell 1 produced a female and cell 2 a male of *C. m. fraterna* on January 22 and 28, 1960. A female *D. sayi* emerged on February 4 from cell 3, and a specimen of *Anthrax irrorata* Say was obtained from cell 4 on February 18.

Ceropales is a "social parasite." Probably, the spider prey of *D. sayi* was left unguarded long enough for the parasite to lay an egg in its book lung. After the spider was placed in the nest, the ceropaline egg is presumed to have hatched and the larva consumed first the *Dipogon* egg and then the spider. J. T. MEDLER, *Department of Entomology, University of Wisconsin, Madison.*

[1] This work was supported in part by the Research Committee of the Graduate School of the University of Wisconsin from funds supplied by the Wisconsin Alumni Research Foundation. The writer wishes to acknowledge the help of K. V. Krombein, who identified the wasps.

EXTENDED DISTRIBUTION FOR PRISTIPHORA ABBREVIATA (HARTIG)

(HYMENOPTERA: TENTHREDINIDAE)

The sawfly *Pristiphora abbreviata* (Hartig) is also known as the "California pear-slug" and has been recorded most commonly in literature under the name *Pristiphora californica* (Marlatt). Previously, it has been recorded only from western North America where it is of sporadic economic importance due to its feeding on leaves of pear trees in the larval stage. During a recent survey for the pear sawfly, *Hoplocampa brevis* (Klug), in the East, a number of specimens of *abbreviata* have appeared. These collections have significantly extended the distribution of this species. Its occurrence in the East is not new, however, since it was taken as early as 1938 in Ontario, Canada. The following are the states and provinces in which this Holarctic species is now known to occur: British Columbia, California, Colorado, Connecticut, New Jersey, New York, Ontario, Oregon, Rhode Island, Utah, Virginia, Washington, Wisconsin. DAVID R. SMITH, *Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D. C.*

NOTES ON THE MOTSCHOULSKY TYPES OF ICHNEUMONIDAE (HYMENOPTERA)

In June of 1964 I had opportunity to see the ichneumonid material of Viktor Motschoulsky. This material is in the Institute of Animal Morphology, Academy of Sciences of the U. S. S. R., Vavilova Street 12/2, Moscow V-133. Dr. G. A. Viktorov is in charge of the collection.

Motschoulsky published a great many papers, most of them on Coleoptera. His single known work on Ichneumonidae is part of a series of papers entitled "Essai d'un catalogue des insectes de l'île Ceylon." The section treating Ichneumonidae is in Bul. Soc. Imp. Nat. Moscou 36:29–31, 1863. In preparation for my "Catalogue and reclassification of the Indo-Australian Ichneumonidae" (1961. Mem. Amer. Ent. Inst., no. 1, 522 pages), I corresponded with Dr. Viktorov about these types, and using information from him attempted to place the Motschoulsky species in their correct genera. When the types were later seen in Moscow, the generic placements published in the catalogue proved to be correct. The Motschoulsky ichneumonid species are as follows:

Porizon pallipes Motschoulsky, page 29. Types: 2♂, 1♀?, and 1 of undetermined sex, all glued on one card. From Nuwara Eliya Mts., Ceylon. These are an *Exochus* of the Pictus Group.

Pachymerus unifasciatus Motschoulsky, page 29. Type: ♂, Nuwara Eliya Mts., Ceylon. This is a species of *Diatora*. It may prove to be the same as one of the other described species.

Pachymerus gracilipes Motschoulsky, p. 30. Type: ♂, summit of Mt. Patannas, Ceylon. This is a species of *Trathala*.

Ophion triangularemaculatus Motschoulsky, page 30. Type: ♂, Ceylon. Motschoulsky described also a questionable female and cited his total material as from the mountains of Nuwara Eliya and Patannas. The type ♂ is a *Bathythrix*, a species with the nervellus broken and the postpectal carina incomplete.

In the Motschoulsky collection are also specimens labeled as types of three additional species. No publication of their names, however, could be located and they are presumed to be manuscript names. One of the manuscript types is a "*Pachymerus*" from Algeria. The other two are a "*Cryptus*" from Cuba and a "*Cryptus*" from Brazil. The Algerian "*Pachymerus*" is probably a *Phygadeuon* (the face and clypeus are against the card mount and are not visible). The Cuban "*Cryptus*" is *Compsocryptus fasciipennis* Brullé, and the Brazilian "*Cryptus*" is a *Cryptanura*. HENRY TOWNES, *American Entomological Institute, 5950 Warren Road, Ann Arbor, Michigan.*

A KEY TO THE SPECIES OF TRITOXA LOEW
(DIPTERA: OTITIDAE)

The genus *Tritoxa* Loew is restricted to North America and includes only the five species here keyed, bibliographic references to which may be found in the Catalog of the Diptera of America north of Mexico (Stone, A., et al., 1965, U. S. Dept. of Agric., A. R. S., Agric. Handbook no. 276: 649). *T. flexa* (Wied.), often called the "black onion fly," is a well-known pest of onion bulbs. I believe that the larger divisions indicated in the key define natural groups and that the distinctions given will cover normally occurring variation, such as the occasional presence of a stump on the posterior crossvein of *T. pollinosa*.

KEY TO THE SPECIES OF **Tritoxa** LOEW

1 (6). Posterior crossvein (*tp*) straight to sinuate, never with stump; parafrontal pruinosity very narrow, not surrounding any bristles or hairs, only immediately adjacent to eye; mesopleuron nearly wholly shining.

2 (3). Black species, wings with black pattern, supracervical hair patch on back of head black; *tp* sinuate; distal hyaline crossband of wing arcuate ..... **T. flexa** (Wied.)

3 (2). Thorax brown, wings with brown pattern; supracervical hairs yellowish; *tp* straight.

4 (5). Distal hyaline crossband of wing straight, attaining costa apicad of anterior crossvein (*ta*) ..... **T. cuneata** Loew

5 (4). Distal hyaline crossband arcuate, attaining costa basad of *ta* ..... **T. incurva** Loew

6 (1). *Tp* angulate, sometimes with stump proceeding from angulation; parafrontal pruinosity broad, including area about base of frontal bristles; tip of cell *Sc* hyaline; supracervical hair patches yellowish.

7 (8). Parafrontal pruinosity extending but ¼ distance from eye to midfrons; *tp* with stump; pleura mostly shining, a little white-pruinose only above fore coxa; proximal hyaline crossband of wing continuous from 1st vein to wing margin ..... **T. ra** Harriot

8 (7). Parafrontal pruinosity extending from eye halfway to midfrons; *tp* usually without stump; mesopleuron largely yellowish pruinose; proximal hyaline crossband disjunct along 3rd vein ..... **T. pollinosa** Cole

GEORGE C. STEYSKAL, *Entomology Research Division, ARS U. S. Department of Agriculture, Washington, D. C.*

TWO SAWFLIES NEW TO NORTH AMERICA (HYMENOPTERA: TENTHREDINIDAE)

Two sawflies, new to North America but indigenous in the Palaearctic region, are reported here for the first time. It is not known whether they are truly Holarctic or are introduced species. The genus *Melisandra* is also new for North America.

I would like to thank Dr. H. E. Milliron, Entomology Research Institute, Ottawa, Canada, for allowing me to examine these specimens in the Canadian National Collection.

Strongylogaster Dahlbom

macula (Klug). British Columbia, Ontario; Europe, Japan. Host: ferns.

Tenthredo macula Klug, 1814. Mag. Gesell. Naturf. Freunde Berlin 8:217.

Melisandra Benson

Melisandra Benson, 1939. Ent. Mon. Mag. 75:110.

Type: *Selandria morio* (Fabricius) Enslin, Orig. desig.

morio (Fabricius). British Columbia, Ontario, Quebec; Europe, Japan.

Tenthredo morio Fabricius, 1781. Species Insectorum 1:414.

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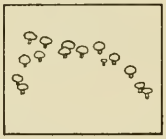

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> ———— and L. M. Walkley. 1951. *in* Muesebeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. Dept. Agr., Agr. Monogr. 2: 90–184.

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TWO NEW SPECIES OF NOCTUIDS
(LEPIDOPTERA, NOCTUIDAE, NOCTUINAE)[1]

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The species of *Abagrotis* described here was set aside as new in the fall of 1960. Sometime later, Mr. John S. Buckett of the University of California, Davis, indicated that he intended to revise the genus *Abagrotis*. We agreed that I would publish the description of the new species from Madera Canyon, Arizona.

A grant (No. 303-Johnson Fund) from the American Philosophical Society made possible the collecting in Madera Canyon during the summer of 1960, and a grant (No. 3339-Penrose Fund) also from the American Philosophical Society made possible the collecting in Madera Canyon during the spring of 1963. This assistance is gratefully acknowledged.

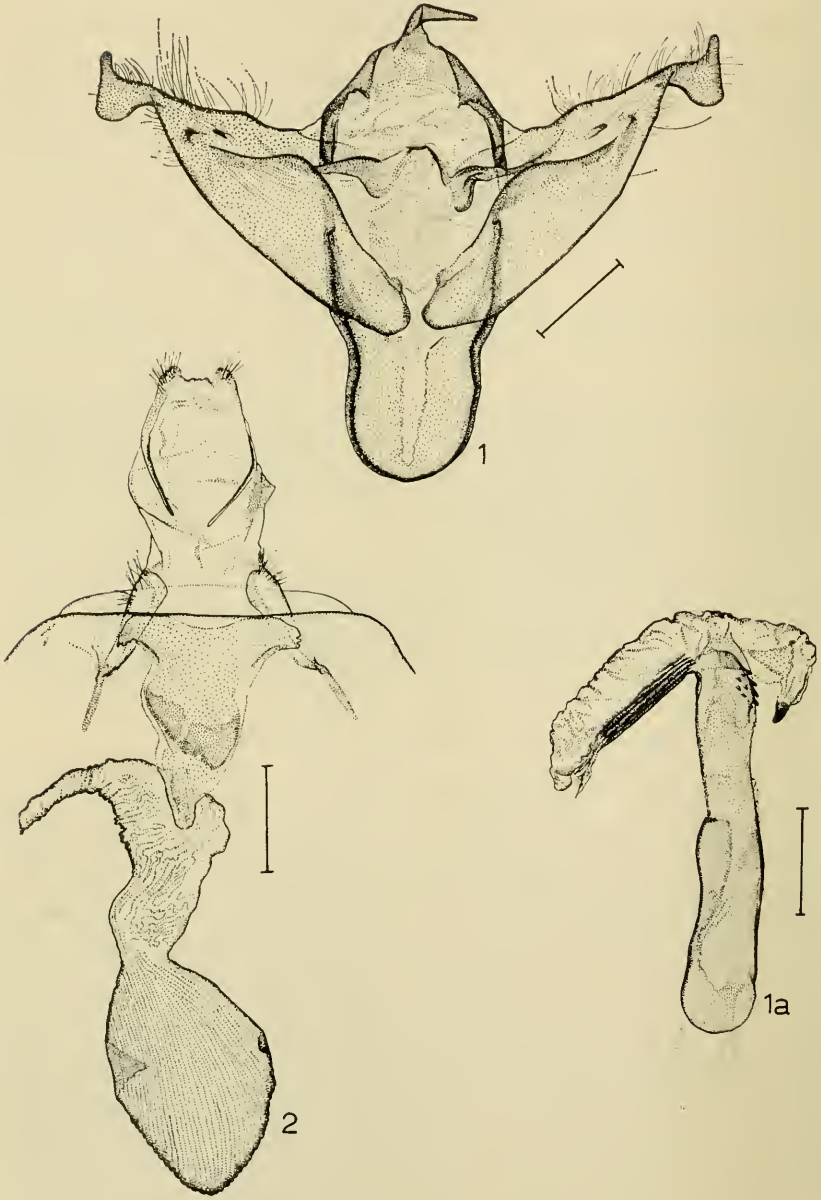
The drawings are by Mrs. Margaret A. Menadue.

Abagrotis alampeta, n. sp.

A dark, rather obscurely marked species, with the male genitalia somewhat similar to *alcandola* Smith, 1908, p. 288 (= *tristis* Barnes and McDunnough, 1912, p. 8, pl. 1, fig. 17), but easily separated by its simple antennae; those of the male of *alcandola* are serrate.

Description: Male with head, thorax, and forewings above deep fuscous or brownish black, the scales pale tipped, giving a frosted appearance. Palpi with first and second segments, except apex of second, black; a broad black band from behind eye to base of forewing, a small triangular black patch in front of eye; the overall effect, a black band beginning on the palpi and ending at the base of the forewing. Patagia with a line of pale, whitish scales on the dorsal margin, a second line of pale scales about one-third below dorsal margin, immediately below this a band of black scales; anterior tuft of thorax low, apex black and a narrow band of black scales below this. Forewing with the markings somewhat indistinct; basal half-line pale with dark marginal lines; antemedial line pale with dark marginal lines, irregularly crenulate, outwardly oblique from costal margin to inner margin; postmedial line pale with dark marginal lines, slightly and irregu-

[1] Immediate publication secured by full payment of page charges—Editor.



Figs. 1–2. *Abagrotis alampeta*. Scale 1 mm. 1, paratype, male genitalia, slide: JGF 4519; 1a, paratype, aedoeagus, slide: JGF 4517; 2, paratype, female genitalia, slide: JGF 4518.

larly crenulate, excurved below costa, then incurved at Cu_1 and Cu_2, then almost straight to inner margin; orbicular circular with a vague, pale annulus; reniform moderately large, with a vague, pale annulus; subterminal vague, pale, somewhat irregular; subterminal area pale; terminal line a series of vague, blackish bars; fringe concolorous with subterminal area. Hindwing and dorsum of abdomen fuscous; hindwings paler toward base; veins dark scaled; fringe with a light yellowish fuscous line at base, followed by a dark fuscous line, outer half white (does not show well in the photographs). Wings below, light fuscous with a frosted appearance except on the disk of the forewings, some black scales intermixed, especially on the costal areas of the forewings. Anal tuft of abdomen reddish brown.

The males show some variation in the amount of pale scaling on the basal and costal areas of the forewing and in the distinctness of the annuli of the reniform and orbicular. The general color may be reddish in some specimens.

The females are generally paler than the males and with a decidedly yellowish gray cast; some are very reddish, but this color phase is not common; about ten to twelve percent of the Madera Canyon population exhibit it.

Expanse: 33–38 mm.

Male genitalia as figured. The adeoeagus with a group of short, stout spines at apex; the vesica armed with a single stout cornutus and a long, broad, ridged, sclerotized plate.

Female genitalia as figured.

Described from 167 males and 204 females from Madera Canyon in the Santa Rita Mountains of southeastern Arizona.

TYPE: Male. Madera Canyon, 4880′, Santa Rita Mts., Santa Cruz Co., Arizona 6 May 1963, J. G. Franclemont. In Franclemont Collection.

PARATYPES: 166 Males: 51, Madera Canyon, 5600′; Santa Rita Mts., Santa Cruz Co., Arizona, 15 June–11 July 1960; 74, Madera Canyon, 5600′; and 41, Madera Canyon, 4880′, Santa Rita Mts., Santa Cruz Co., Arizona, 20 April–23 May, 1963. 204 Females: 1, Madera Canyon, 5600′, Santa Rita Mts., Santa Cruz Co., Arizona, 8 October 1959; 91, Madera Canyon, 5600′; Santa Rita Mts., Santa Cruz Co., Arizona, 15 June–15 July 1960; 61, Madera Canyon, 5600′; and 51, Madera Canyon, 4880′, Santa Rita Mts., Santa Cruz Co., Arizona, 20 April–27 May 1963; all collected by J. G. Franclemont. Paratypes will be distributed to the United States National Museum, the British Museum (Natural History), the Canadian National Collection, the American Museum of Natural History and the Los Angeles County Museum of Natural History; the majority will be retained in the Franclemont Collection; two are at present in the Bauer–Buckett Collection, Davis, California and others will be deposited in that collection.

The species has also been collected in Cave Creek Canyon in the Chiricahua Mountains of southeastern Arizona and in the Flagstaff area of north central Arizona.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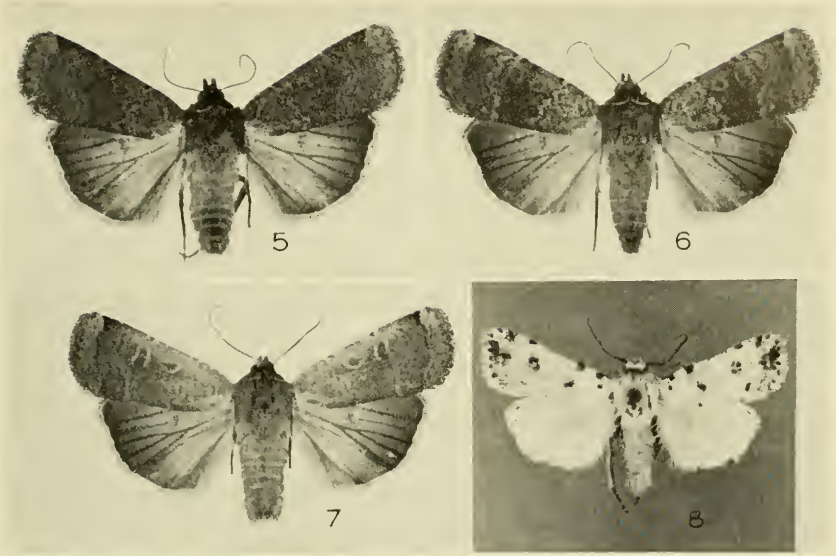

Figs. 5–7. *Abagrotis alampeta.* Scale approx. 1.4 ×. 5, *Abagrotis alampeta.* TYPE; 6, *Abagrotis alampeta,* paratype male with pale scaling; 7, *Abagrotis alampeta,* paratype female; 8, *Anicla cemolia,* TYPE.

Five female paratypes of *barnesi* Benjamin, 1921, p. 97, from the following localities are this species: Mohave., Co., Ariz. (2), Redington, Arizona (1), and Palmerlee, Cochise Co., Ariz. (2).

Anicla cemolia, n. sp.

This species is very similar in appearance to the figure of *Agrotis altes* Druce, 1889, vol. 1, p. 285, vol. 3, pl. 27, fig. 12, described from Teapa, Tabasco, Mexico. Hampson, 1903, p. 525, treates *altes* as a junior synonym, the male, of *Agrotis ornea* Druce, 1889, vol. 1, p. 285, vol. 3, pl. 27, fig. 11, described from near Mexico City. The forewings of the new species are paler; there is no conspicuous black spot below 2A as figured by Druce for *altes* and *ornea*; and the hindwing is white, slightly hyaline in both sexes, not shaded outwardly with fuscous as in the male (*altes*) of *ornea* and not dark fuscous as in the female. This species differs from *Anicla infecta* (Oehs.) by its much smaller size, white hindwings, and narrowly pectinate male antennae.

Description: Antennae of male narrowly pectinate, of female simple and sparsely ciliate. Head and thorax light gray with a slight yellowish cast, with a sparse

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Figs. 3–4. *Anicla cemolia.* Scale 1 mm. 3, paratype, Windley Key, Monroe Co., Florida, male genitalia, slide: JGF 5276. 3a, paratype, aedoeagus, slide: JGF 5276. 4, paratype, Key Largo, Monroe Co., Florida, female genitalia, slide: JGF 5272.

scattering of black scales and with a small patch of black scales at middle of collar (patagia). Forewing concolorous with head and thorax, light gray with a yellowish cast and with a scattering and clustering of black scales; the lines obsolescent; the basal line represented by a small black spot on costa near base of wing and a second black spot in fold below Cu; ante-medial line represented by a black spot on costa, a black spot in fold, and a diffuse cluster of black scales on the inner margin; postmedial line represented by a black spot on costa and vague line of black scales, the line excurved below costa, then slightly curved to inner margin; reniform a broad gray annulus with a pale central area and two black spots, the larger on the outer side, the smaller on the inner side; subterminal line diffuse, irregular, broad, blackish, area beyond subterminal line blackish, terminal line a series of black dots on the veins; fringe concolorous with ground color of wing. Hindwing white; two black spots near the apical angle representing the terminal line; fringe white.

Expanse: 25–28 mm.

Male genitalia as figured.

Female genitalia as figured.

TYPE: Male. Tavernier, Monroe Co., Florida, October 21, 1965, J. N. Todd. In Franclemont Collection.

PARATYPES: 14 males and 4 females, Tavernier, Monroe Co., Florida, August 16, 1955–October 23, 1955, J. N. Todd; 1 male in United States National Museum Collection, 2 males in Franclemont Collection, 11 males and 4 females in C. P. Kimball Collection; 8 males and 2 females, Key Largo, Monroe Co., Florida, March 27, 1965–April 27, 1965 and July 21, 1965–August 26, 1965, Mrs. Spencer Kemp; 3 males and 2 females in Franclemont Collection, 5 males in C. P. Kimball Collection; 1 male, Windley Key, Monroe Co., Florida, December 11, 1955, J. N. Todd; in Franclemont Collection; 1 female, Craig, Florida, April 16, 1956, J. N. Todd; in the United States National Museum Collection.

There are twenty males and five females from Tavernier Key and one male from Key Largo also before me, but the condition of these specimens is too poor to include them in the type series.

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DESCRIPTION OF HAEMAGOGUS AERITINCTUS, A NEW SPECIES FROM BRITISH HONDURAS, WITH A NOTE ON THE VALIDITY OF HAEMAGOGUS LUCIFER (H. D. AND K.)

(DIPTERA: CULICIDAE)

PEDRO GALINDO[1] *and* HAROLD TRAPIDO[1, 2]

In 1955, while conducting investigations on the ecology of yellow fever in Middle America, the authors visited British Honduras for several days. The specific objective of this trip was to investigate the mosquito fauna of the area in relation to the possible transmission of yellow fever virus. At the time, there was an outbreak of jungle yellow fever moving west along the north coast of Honduras toward the east coast of Guatemala and British Honduras. We arrived at Belize several days after a devastating hurricane had passed through that territory, so that conditions were not favorable for the capture of adult mosquitoes. Therefore, efforts were concentrated on the finding of larvae in tree-holes within a variety of ecological situations. Collections were made in the vicinity of Belize and of Stann Creek, as well as at several points along the road between these two towns.

The present report deals with descriptions of the adult, male terminalia, pupa and larva of a new species of *Haemagogus* found breeding in mangrove associations at two localities. A discussion is also included of the taxonomic relationships between the new species and related forms. From the evidence presented the authors conclude that *Haemagogus lucifer* (Howard, Dyar and Knab, 1912) is a valid species and not a synonym of *H. regalis* Dyar and Knab, 1906 as proposed by Komp (1954).

Haemagogus (Haemagogus) aeritinctus, n. sp.

MALE.—*Head.* Proboscis somewhat longer than the fore femur, uniformly purple in color. Palpi very short, barely longer than the clypeus, clothed with purple scales. Clypeus naked, shiny black in color. Antennae about half as long as the proboscis, sparsely plumose; tori dark, bare. Vertex blue-scaled with a very narrow line of silvery scales bordering the eyes. Occiput clothed with flat, broad, straw-colored scales. Mentum light-scaled.

Thorax. Anterior pronotal lobes large, inner angle clothed with silvery scales, remainder of lobe blue-scaled. Mesonotum black, clothed with bright coppery scales which give a purplish reflection under oblique illumination, except for a small spot of blue-green scales above the roots of the wings. Scutellum with a mixture of blue-green and coppery scales. Pleuron mostly covered with bright silvery scales except for posterior pronotal lobe and meron which are bare and shiny black. Pleural chaetotaxy as follows: no propleurals, two or three black

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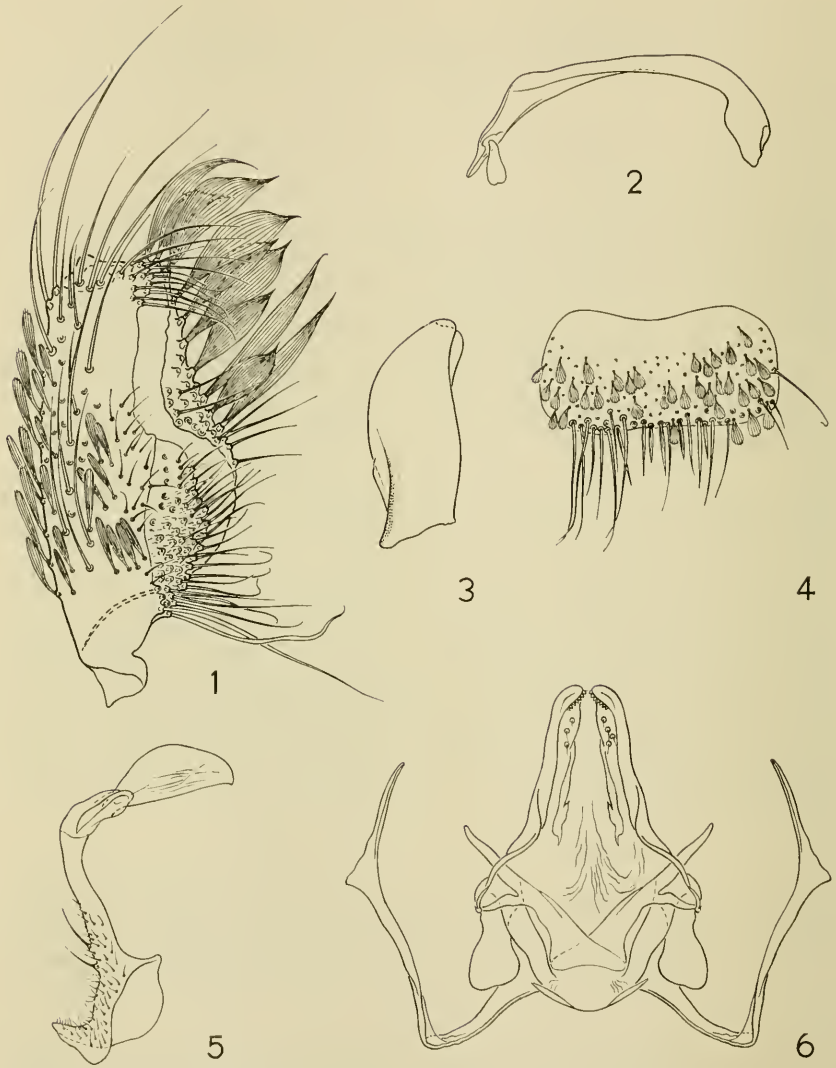


Male terminalia of *Haemagogus aeritinctus* n. sp. Fig. 1, Basistyle; fig. 2, Dististyle; fig. 3, Mesosome; fig. 4, Eighth tergite; fig. 5, Claspette; fig. 6, Tenth sternite.

setae on posterior pronotum, no post-spiraculars, no sternopleurals, two yellowish pre-alars, three or four upper mesepimerals. Postnotum with one seta near its posterior border. Coxae and trochanters yellowish with a patch of silvery scales. Femora clothed with purplish scales, base and undersides largely pale-scaled; hind femur also bearing a long patch of silvery scales on its anterior surface.

Tibiae and tarsi covered with purple scales; tarsal claw formula 1.1–1.1–0.0. Wings shorter than the abdomen; cell-R_2 much longer than its petiole. Halter with pale base and dark knob, tip silvery-scaled.

Abdomen. Abdominal tergites clothed with purple scales and large basal segmental patches of silvery scales which become progressively smaller apically.

Male terminalia. Eighth tergite (Fig. 4) bearing 42 large setae from outstanding sclerotized bases in irregular rows which are at most three setae deep. The setae of the posterior row appear to be very narrow, striated, modified scales and are flanked by three or four of the longest setae of the sclerite.

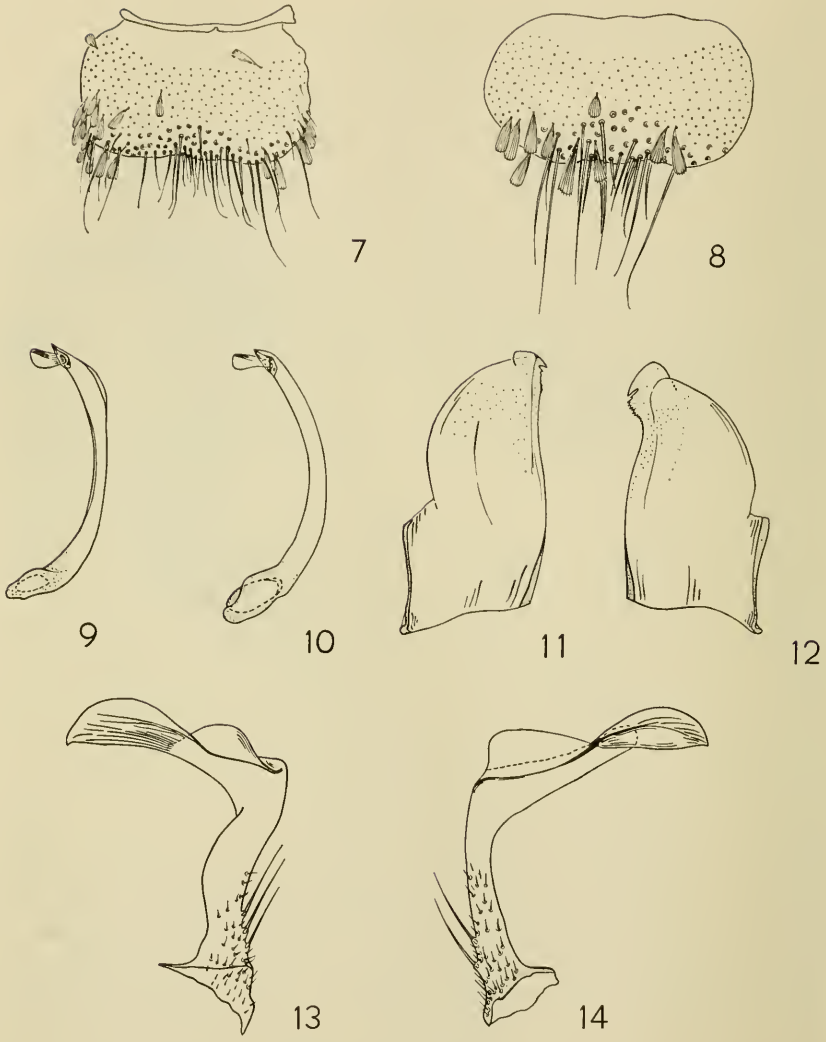
Basistyle as figured (Fig. 1). Dististyle (Fig. 2) about two-thirds the length of the basistyle, expanded on distal third then tapering sharply to a rather acute point, giving the appearance of a narrow snout; appendage of the dististyle inserted subapically, expanded distally, tongue-like. Stem of claspette (Fig. 5) rather narrow, slightly sinuate, bent sharply at right angles on distal third, clothed with sparse short pile on proximal half and bearing two stout setae from prominent insertions on its inner surface near the base. Filament a flat, widely expanded leaf inserted distally on the stem. Other parts as illustrated in figures.

FEMALE.—Coloration as for the male; proboscis slightly shorter; tarsal claws unarmed.

LARVA.—*Head* (Fig. 18). Globose, dark. Antennae glabrous, small, barely exceeding the anterior border of head; antennal hair single, short, inconspicuous, inserted slightly beyond the middle of antennae. Head chaetotaxy as figured.

Thorax. Skin glabrous. Chaetotaxy as follows: *Prothoracic hairs*: Nos. 1, 2, 3 inserted in the same chitinized plate; No. 1 long, with 2–5 branches; No. 2 about equal to No. 1, single; No. 3 as long as No. 1, 4–8 branched; No. 4 slightly shorter than No. 1 with 3–7 branches; Nos. 5 and 6 equal in size, with coalescing sclerotized bases, longer than No. 1; No. 7 of same size as Nos. 5 and 6, 3–4 branched; No. 8 slightly more than half as long as No. 4, with 3–8 branches; Nos. 9, 10, 11 and 12 inserted in same sclerotized tubercle, Nos. 9 and 11 always single; No. 10 with 1–5 branches; No. 12 single or double. *Mesothoracic hairs*: No. 1 with 2–8 branches; No. 2 slightly more than half as long as No. 1, single; No. 3 single, longer than No. 2; No. 4 about equal to No. 3, single; No. 5 single or double; Nos. 6 and 7 inserted on one sclerotized plate, both about equal to No. 5 in length; No. 6 with 4–8 branches; No. 7 single; No. 8 5–9 branched; Nos. 9, 10, 11 and 12 inserted on same sclerotized base, No. 9 single as long as No. 8; No. 10 6–8 branched; No. 11 single; No. 12 shorter than No. 4 with 1–3 branches; No. 13 multiple, about equal to No. 8; No. 14 with 3–7 branches. *Metathoracic hairs*: No. 1 3–7 branched; No. 2 longer than No. 1, single; No. 3 shorter than No. 2, 2–6 branched; No. 4 with 1–3 branches, shorter than No. 1; No. 5 about equal to No. 4 with 2–6 branches; No. 6 single, as long as No. 2; No. 7 a multiple tuft; No. 8 about as long as No. 5, multiple; Nos. 9, 10, 11, 12 inserted on same sclerotized base; No. 9 single, No. 10 a multiple tuft, No. 11 single, No. 12 3-branched.

Abdomen. Skin glabrous. Chaetotaxy as follows: Hair No. 6 with 3–5 branches on segments I and II, double or rarely triple on segments III to VI, single on segment VII; hair No. 7 single, or rarely double on segment I. Subdorsal hairs very variable, usually with 3–4 branches. Comb-scales 20 to 38 in number, arranged in a patch 3 rows deep. Terminal segments as figured (Figs. 15, 16 and 17).



Male terminalia parts of *Haemagogus lucifer* and *H. regalis*. Fig. 7, *H. lucifer*: 8th tergite; fig. 8, *H. regalis*: 8th tergite; fig. 9, *H. lucifer*: Dististyle; fig. 10, *H. regalis*: Dististyle; fig. 11, *H. lucifer*: Mesosome; fig. 12, *H. regalis*: Mesosome; fig. 13, *H. lucifer*: Claspette; fig. 14, *H. regalis*: Claspette.

PUPA.—Trumpets short and stumpy, diameter of pinna about twice the length of the meatus; tracheoid small, about ⅓ as long as meatus. Abdominal chaetotaxy as figured (Fig. 19). Rudimentary spiracles on segments II–VII quite prominent and located laterally on the segments.

Type Material

Holotype: Male, mounted on card point. Associated larval and pupal skins mounted on a slide. Terminalia stained, dissected and mounted on a second slide. Reared from larvae collected in a rot-hole of a red mangrove tree (*Rhizophora mangle*), in the vicinity of Stann Creek, British Honduras, on 5 October, 1955. P. Galindo and H. Trapido, collectors.

Allotype: Female, mounted on card point. Associated larval and pupal skins mounted on a slide. Same collecting data as holotype.

Paratypes: Two males mounted on card-points. Associated larval and pupal skins and terminalia mounted on separate slides. Same collecting data as holotype.

One male mounted on a card-point. Associated larval and pupal skins and terminalia mounted on separate slides. Reared from larvae taken in a rot-hole of a *Ficus* tree at the fringe of a mangrove swamp, near Belize, British Honduras, on 5 October, 1955. P. Galindo and H. Trapido, collectors.

Eight males mounted on card points. Associated pupal skins and terminalia mounted on separate slides. Reared from pupae. Seven specimens with same collecting data as holotype, one taken at Belize, same collecting data as paratype above.

Seven males mounted on card-points. Two with terminalia mounted on slides. Four with same collecting data as holotype, and three from Belize.

Four females mounted on card-points. Associated larval and pupal skins on slides. Same collecting data as holotype. Twelve females, nine from type locality and three from Belize, mounted on card-points with associated pupal skins mounted on slides.

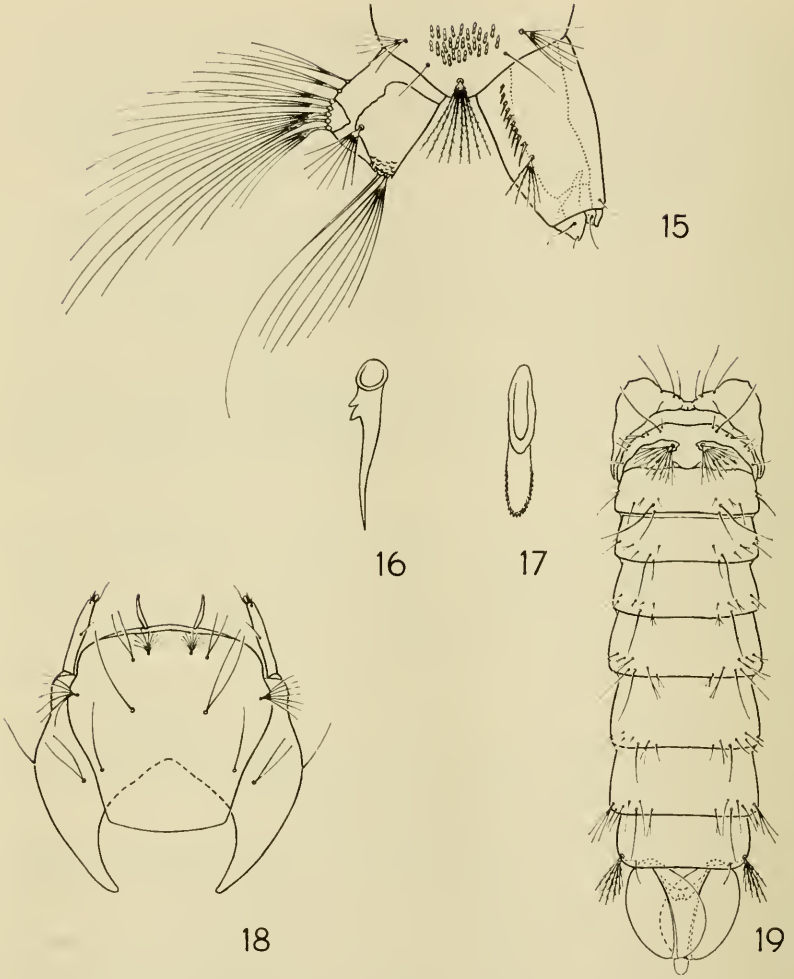
Four females mounted on card-points taken while attempting to bite in a mangrove swamp near Belize, B. H., on October, 1955. P. Galindo and H. Trapido, collectors.

Ten larval skins, eight from the type locality and two from Belize, mounted on slides.

Disposition of type material. Holotype and allotype to be deposited in the U.S. National Museum. Paratype series to be divided between the U.S. National Museum and the mosquito collections of the University of California at Los Angeles (U.C.L.A.) and of Gorgas Memorial Laboratory, Panama.

Taxonomic discussion. This new species belongs to the group of Middle American species of *Haemagogus* sens. str. which are commonly found breeding in mangrove swamps. These species are: *regalis* D. and K., *lucifer* H. D. and K., *iridicolor* Dyar, *chalcospilans* Dyar and *boshelli* Osorno.

The peculiar coppery sheen of the mesonotal scales in *aeritinctus* n.



Immature stages of *Haemagogus aeritinctus* n. sp. Fig. 15, Terminal segments of larva; fig. 16, Individual pecten tooth; fig. 17, Individual scale of comb of 8th segment; fig. 18, Head capsule of larva, fig. 19, Abdominal chaetotaxy of pupal skin.

sp., differentiates it from all other species of *Haemagogus*, with the exception of *uriartei* Shannon and Del Ponte, which occurs in meridional South America and belongs to a different subgenus. The yellowish color of the coxae of *aeritinctus* is shared only by *H. chalcospilans*, from which *aeritinctus* may be separated by the color of the mesonotal scales, the longer proboscis and the shape of the dististyle

and claspettes of the male terminalia. The male terminalia of *aeritinctus* shares characters with both *regalis* and *lucifer*. The shape of the dististyle is like the latter species while the claspettes and mesosome are much as in *regalis*. However, the three species may be separated by the number of setae with sclerotized insertions on the eighth tergite. In *aeritinctus* they range from 33 to 46 (in 20 specimens) with a mean of 40.9; in *regalis* from 46–85 (in 59 specimens) with a mean of 64.5, and in *lucifer* from 62–104 (in 78 specimens) with a mean of 85.8.

Komp (loc. cit.) sank *H. lucifer* (H. D. and K., 1912) a mosquito described from Panama, in the synonymy of *H. regalis* D. and K., 1906 with type locality in Sonsonate, El Salvador, stating: "The writer has examined the male terminalia of *H. lucifer* on slide No. 1461 in the U.S. National Museum collection, which was made from a male of the type series . . . and finds that the terminalia of this specimen correspond in all particulars with the male terminalia on three slides . . . which are from the type series of *H. regalis*. The writer has many specimens of '*H. lucifer*' from Panama, of which he has dissected and mounted the male terminalia. These agree with those of the three slides of the type series of *H. regalis, noted above*." In further support of his case, Komp (loc. cit.) published four photomicrographs of the terminalia slides of *H. lucifer* and *H. regalis* discussed above, pointing out the apparent similarity of the different parts in these preparations.

The authors have been fortunate in working with fresh material of *H. regalis* from El Salvador, Guatemala and Mexico, as well as with a long series of *H. lucifer* from various parts of Panama and Colombia and find these two taxons to differ in the following respects:

a). The shape of the dististyle. In *H. lucifer* (Fig. 9) it swells beyond the middle and then tapers to a sharp point, appearing narrowly snout-shaped. In *H. regalis* (Fig. 10) there is no appreciable swelling in the dististyle which is arcuate and tapers gradually and very slightly from base to apex. This character can be appreciated in the photomicrograph of the terminalia of *H. lucifer* published by Komp (loc. cit.) but cannot be clearly distinguished in the photomicrograph of *H. regalis*, due to the orientation of the specimen. However, one of us (P.G.), has examined all the slides of the type series of *H. regalis* in the U.S. National Museum, and finds that, with the exception of the holotype, they all appear to agree well in this characteristic with the fresh material in the authors' collection, despite the fact that they are rather poor preparations. The holotype lacks both dististyles so it could not be studied properly.

b). The mesosome of *H. regalis* (Fig. 12) has a rather prominent subapical serrated carina along the ventral surface. In *H. lucifer* (Fig. 11) this carina is always missing although some slight serrations are sometimes present just below the apex. This character can only be

seen in preparations where the mesosome has been dissected out and mounted in lateral view.

c). In *H. lucifer* (Fig. 13) the stem of the claspette swells medianly, thus appearing much stouter than in *H. regalis* (Fig. 14) which has slender and slightly sinuate claspette stems. This characteristic is extremely constant and can be seen in Komp's photomicrographs, but the difference was thought by him to be due to distortions during the preparation of the slides which are in poor condition.

d). Both forms have thick, stiff setae inserted in sclerotized bases on the distal margin of the eighth tergite, but the mean number of these setae differs. In 59 specimens of *H. regalis* (Fig. 8) the number of setae range from 46 to 85 with a mean of 64.5. In 78 specimens of *H. lucifer* (Fig. 7) the number of thick setae on the eighth tergite range from 62 to 104 with a mean of 85.8.

e). These two forms occupy widely different geographical areas. *H. lucifer* is known from Colombia, Panama and southeastern Costa Rica and is replaced in Costa Rica along both coasts by *H. iridicolor*, which extends into Nicaragua. *H. regalis*, on the other hand, occurs from the Pacific coast of Mexico in the state of Chiapas, south to the Gulf of Fonseca in the border area between El Salvador and Honduras. On the Atlantic coast it has been found only in the states of Veracruz and Tabasco in southern Mexico, being replaced to the south in British Honduras and Guatemala by the new species *H. aeritinctus*. The latter is in turn isolated from contact with *H. lucifer* by *H. iridicolor* which occupies all of the Atlantic littoral of Nicaragua and Costa Rica.

About a year after his publication, the late W. H. W. Komp in a letter to the authors, stated: "I am now inclined to believe that *lucifer* is a subspecies of the more northerly occurring *regalis*." However, in view of the evidence presented above we see no reason at present to treat these two forms as only subspecifically distinct and therefore consider them as distinct species.

Geographical distribution. Haemagogus aeritinctus is known only from Belize and Stann Creek, British Honduras, and from the east coast of Guatemala.

Altitudinal distribution. Sea-level.

Ecology. The authors have taken this species in mangrove swamp at Stann Creek, and among *Ficus* trees adjacent to mangrove at the outskirts of Belize. Larvae were extremely abundant in rot holes in the mangrove and *Ficus*, but adults attacking man were scarce. The scarcity of adults is probably not significant as the collecting was done only several days after a devastating hurricane in the area. The adults which approached attacked about the head. Careful search of the coastal mangrove of northern Honduras on several occasions failed to

reveal any *Haemagogus* there. We also made one search of the mangrove near Chetumal, Quintana Roo, Mexico, just north of British Honduras, but did not find *Haemagogus*. Dr. Jorge Boshell (personal communication) collected the new species along the east coast of Guatemala just north of Puerto Barrios. He captured adults attempting to bite in mangrove swamps and recognized the species on sight by the coppery sheen of the mesonotum, the yellowish coxae and the habit of females of attacking man about the head. It appears that this is a species of restricted range. It is morphologically close to, and the ecological equivalent of the littoral species *H. regalis*.

Relation to yellow fever. Nothing is known, but probably not of significance in the epidemiology of sylvan yellow fever because of its restricted littoral range and habitat. The species is in part peridomestic however, and appears to be abundant at Belize. Thus it might conceivably become involved in the transmission of yellow fever from man to man if the disease were once introduced.

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A NEW MEMBER OF A SIBLING SET BELONGING TO THE DROSOPHILA TRIPUNCTATA GROUP

(DIPTERA: DROSOPHILIDAE)

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Drosophila leticiae Pipkin, n. sp.

External characters of imagines: ♂ ♀, Arista with 6 or 7 dorsal and 3 ventral branches in addition to terminal fork. Front dull yellowish brown, darker in ocellar triangle; ocelli pink; 7 inconspicuous frontal hairs on each side apex of frontal triangle; orbital hairs 5 or 6. Proclinate orbital ⅕ posterior reclinate; anterior reclinate thin, about ¼ proclinate. Face, ♂, white; ♀, yellowish. Carina broad, flat, widening distally; white in male; yellowish brown in female. One prominent oral bristle; proboscis yellowish, shining, darker distally, with yellowish hairs. Cheek yellowish, absent behind; width from base of oral bristle to eye border 1/12 greatest diameter of eye. Orbits yellowish brown. Eye dull red, a little darker in the dorsal ⅕; pile straw-colored. Eye index 1.2. Palpi yellow, with one prominent subapical hair, 2 others on lateral margin of palpus in addition to small hairs. Acrostichal hairs in 6 rows; mesonotum shining brown; pleura shin-

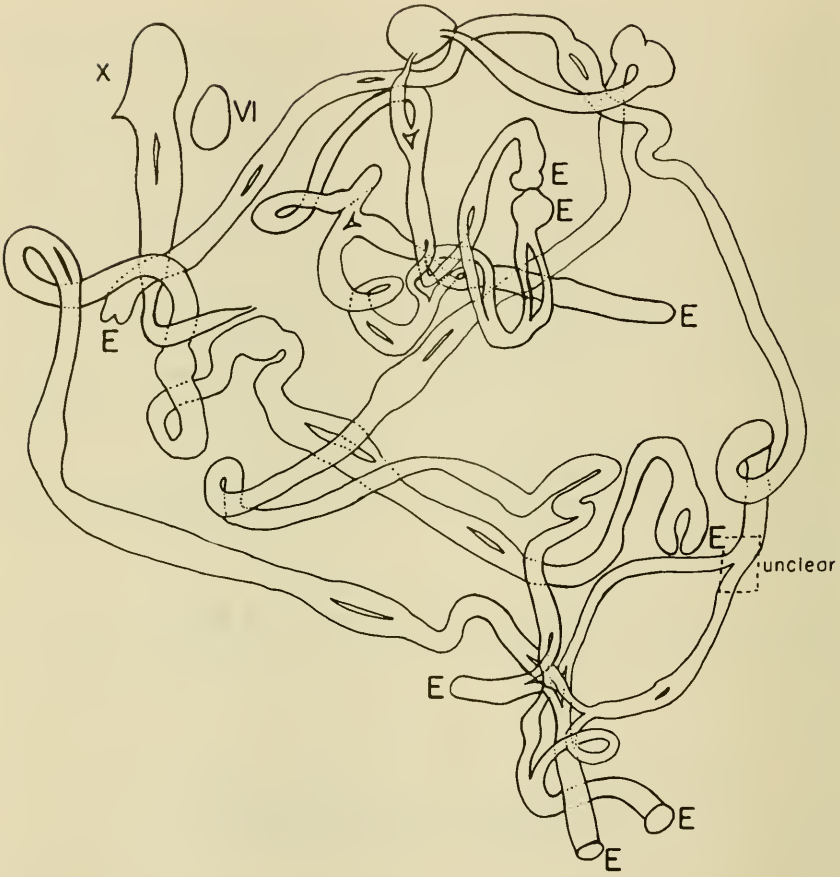

Fig. 1. Outline drawing of paired homologues of hybrids between *D. leticiae*, n. sp. and *D. metzii* showing translocations involving the 4 longer autosomes and some absence of pairing of portions of homologues. Only the X chromosomes (accidentally fragmented in making the preparation) and the shortest autosome, located beside the X, are not involved in the translocations. Ends of chromosomes are marked "E."

ing yellowish-brown; scutellum dark brown; anterior scutellars slightly divergent; halteres dusky yellowish. Anterior sternopleural ½ posterior sternopleural; mid-sternopleural thin, ¾ anterior. Legs yellowish; 2 golden hairs proximal end basal metatarsus of leg 3. Wings brown; veins darker brown; posterior crossvein clouded; costal index, 3.1; 4th vein index, 1.5; 5x index, 1.25; 4c index, 0.75; Heavy bristles on the basal ⅓ of third costal section; one prominent hair at apex of first costal section. Abdomen (♂) yellowish brown with shining black apical bands on tergites 2–6 extending almost to lateral margins, with indistinct medial interruptions on tergites 2, 3, 4; apical band thickened medially on tergites 5, 6. Anal plates yellowish; flattened laterally to form a keel shaped projection; numerous bent

hairs on ventral margin. Sternites pale gray except most posterior one which is yellowish. Female abdomen yellowish brown; tergites 2, 3, 4, 5 with black shining apical bands fading at lateral margins; paramedial extensions on these tergites; tergite 6 with black medial trapezoid shaped mark; tergite 7 yellow; sternites pale.

Body length (etherized) ♂ 2.5 mm; ♀ 3 mm. Wing length ♂ 2.25; ♀ 3 mm.

Internal characters of imagines and genitalia: Anterior malpighian tubules branched basally at a distance the width of intestine, free, with distal ends turned back; posterior malpighian tubules apposed with continuous lumen; testes pale yellow; 3 inner coils (vas deferens) and 4 outer coils (testis proper); sperm pump with 2 posterior diverticula each scarcely the length of the greater diameter of the pump. Forceps with 11–13 primary teeth arranged in a sinuous row; no secondary teeth; the two forceps joined by a medially grooved plate; about 8 marginal bristles and 7 bristles on the upper surface of the forceps; toe rounded with about 9 bristles. A long medially directed bristle on the posterior border of each concha of the hypandrium. Apodeme of the phallus a slightly bent rod; head of phallus simple, bulbous distally with ventrally attached laterally projecting ears. Spermatheceae with distal portion dark brown, less chitinized proximally; oval, no constriction on inner duct; ventral receptacle thin, tightly coiled, with about 20 gyres. Ovipositor golden brown, acuminate at tip; 19 teeth.

Egg: with 4 slender filaments, each 0.7 the length egg. Puparium golden brown; aperture of anterior spiracles ringed with black stigmatic plates bearing about 27 amber filaments; horns including anterior spiracles a little less than ½ the length of the puparium; posterior spiracles black; apart.

Chromosomes: Laboratory culture 3L5 shows salivary chromosomes with a medium length X, markedly heterochromatic at the right hand end; one long autosome, three medium length autosomes, and a very short autosome; chromocenter scant. Salivary chromosomes of hybrids between this species and its sibling, *D. metzii* (Barro Colorado Island strain), show the presence of translocations involving the 4 long autosomes and a lack of pairing of portions of all homologues (Fig. 1).

Belongs in subgroup IV of the *tripunctata* species group of the subgenus *Drosophila*, being a sibling of *D. metzii Sturtevant* 1921 and *D. pellewae* Pipkin and Heed, 1964. *D. leticiae* differs from *metzii* and *pellewae* in the distinctly smaller male body length, absence of sexual dimorphism of abdominal coloration, and possession of fewer primary teeth of forceps. *D. leticiae* further differs from *metzii* in the yellowish brown color of the female face, less chalky aspect of the male face; from *pellewae* in the white face of the male. Reciprocal crosses of *D. leticiae* and *D. metzii* yield some viable hybrids. Many of the hybrids were fertile *inter se*, but laboratory populations derived from them usually died out in F_2 or F_3. *D. pellewae*, when used as the female parent, produced few or no progeny with *D. leticiae* males, though hybrids were obtained from the reciprocal cross. The latter were sometimes fertile *inter se*, but laboratory populations derived from them usually die out in F_2 or F_3.

Distribution: Holotype ♂; 12 ♂, 12 ♀ paratypes from laboratory

culture 3L5 developed from 15 founder females netted over fallen cacao fruit in house yard on the Amazon River at El Marco, Brasil, near Leticia, Colombia, June 16–20, 1964 (U.S. National Museum); 10 ♂ and 10 ♀ paratypes from laboratory stock 3L5, same data, (Drosophila Type and Reference Collection) Austin, Texas.

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NEW SPECIES OF DOLICHOPODIDAE FROM THE UNITED STATES AND MEXICO
(Diptera)

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The present paper is primarily intended to supplement the synopsis of the Dolichopodidae of the Southeastern United States (Robinson, 1964), and includes those undescribed species from the Eastern U.S. which have been encountered since that study. A number of species from the Western U.S. and some related or otherwise interesting species from Mexico and Central America are also described.

Dolichopus crassitibia, n. sp.
(Figs. 1–4)

Male.—Length 3.0 mm; wing 3.0 mm by 1.0 mm.

Face about a fourth as wide below as high, becoming gradually wider above, covered with silvery white pollen; front broad, broader above, metallic greenish, almost completely covered with white pollen; palpus small, pale; proboscis brown. Antenna black; segment 1 short, widened distally from a narrow base, with hairs above; segment 2 shorter and wider, very short below; segment 3 about as long as wide, blunt; arista from near middle of dorsal edge. Lower postocular setae pale and somewhat flattened.

Thorax metallic green, slightly dulled with grayish pollen, a violet band between rows of small acrostichals; 6 pairs of large dorsocentrals, 5th pair set inward from the rest of the line; scutellum with large pair of bristles and small erect hair on the lateral margin; a black bristle over the fore coxa.

Legs black with black setae, all knees, tips of fore and middle tibiae, inner surface of fore tibia, and base of fore metatarsus yellowish. Fore and middle coxae with numerous bristles on anterior surface, distal ones large; middle and

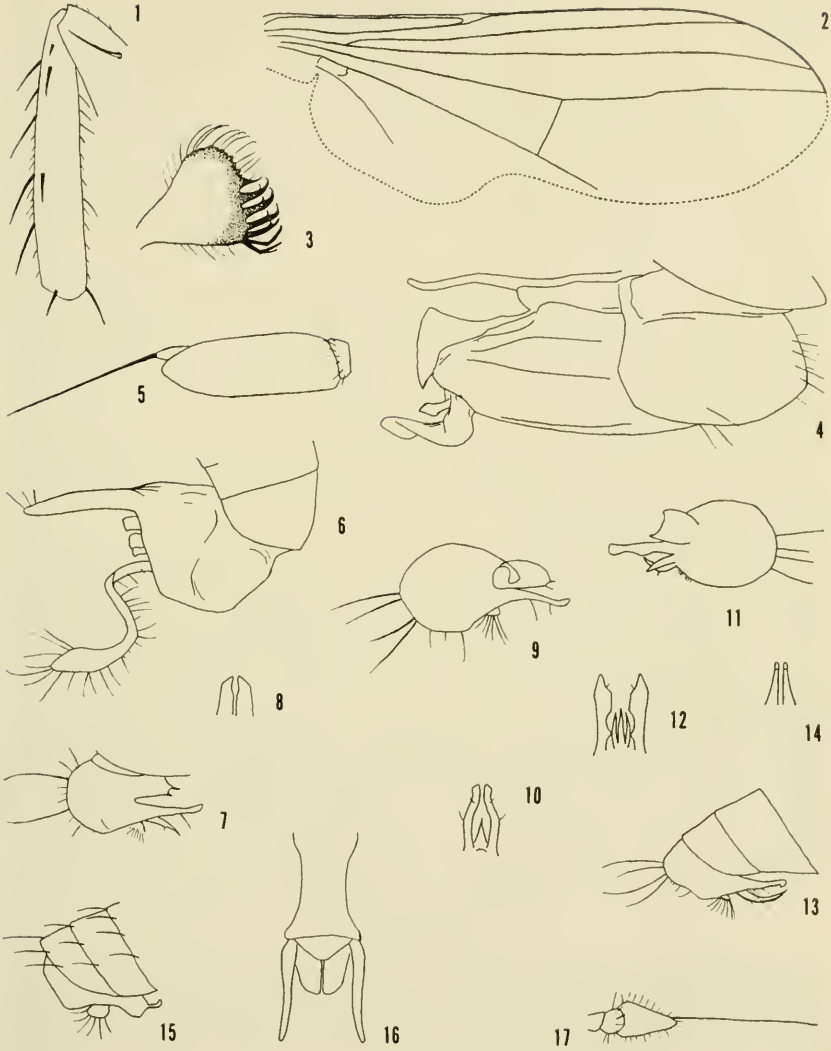

Fig. 1–17. Dolichopodidae, males. *Dolichopus crassitibia* n. sp. 1, hind tibia; 2, wing; 3, hypopygial lamella; 4, hypopygium. *Rhaphium steyskali* n. sp. 5, antenna; 6, hypopygium. *Diaphorus pseudopacus* Robinson. 7, hypopygium; 8, tips of hypopygial appendages, ventral view. *Diaphorus canus* Robinson. 9, hypopygium; 10, hypopygial appendages, ventral view. *Diaphorus bakeri* n. sp. 11, hypopygium; 12, hypopygial appendages, ventral view. *Diaphorus gibbosus* Van Duzee; 13, hypopygium; 14, tips of hypopygial appendages, ventral view. *Chrysotus clypeatus* n. sp. 15, hypopygium; 16, face and mouth, palpi turned edgewise; 17, antenna.

hind coxae with a large external bristle; middle and hind femora with a preapical anteriorly, hind femur with a few long pale hairs along middle of lower posterior surface; fore tibia with a pair of indistinct dorsals near base, a second pair near the middle, of which the posterodorsal is rather large, 2 small posterodorsals and 2 larger apicals; middle tibia with 2 large anterodorsals and 1 small posterodorsal in basal third, 1 anterodorsal, 1 posterodorsal, and 1 ventral near distal third, 5 apicals; hind tibia (fig. 1) greatly thickened, with 3 anterodorsals of which 2 including a small one are near the base, 4 large posterodorsals, numerous indistinct ventrals, 2 apicals. Lengths of segments of fore tarsus from the base as 8-4-3-2-2; middle tarsus as 10-5-4-3-3; hind tarsus as 8-8-6-4-3, segment 1 very thick with 2 large bristles above.

Wing (fig. 2) rather oblong with a prominent anal angle and a large sinus behind the crossvein, hyaline with veins brown. Costa swollen at juncture of vein 1; veins 2 and 4 nearly parallel beyond the crossvein, vein 4 with slight double bend before middle of last part, vein 3 converging with vein 4 toward the tip; crossvein about as long as last of vein 5. Calypter, its setae, and knob of halter pale, stem of halter brown.

Abdomen about as long as thorax, tapering, shining metallic green dulled with grayish pollen on sides. Hypopygium (fig. 4) two-thirds as long as preabdomen, black with greenish tinges; lamellae (fig. 3) rounded, whitish with a jagged brown border; inner appendages pale.

Holotype ♂, from wasp nest, on shore of Potomac River by Plummers Island, Montgomery Co., Maryland, June 16, 1963, K. Krombein. Specimen in USNM, no. 69332. This is the "*Dolichopus* n. sp." listed as prey of *Ectemnius* (*Hypocrabro*) *paucimaculatus* (Packard) by Krombein (1964, p. 86).

The species would key to the group of species containing *Dolichopus kansensis*, *D. ovatus*, and *D. acuminatus* using my key to the southeastern species. The new species differs from these and from most other species of *Dolichopus* by the greatly thickened hind tibia and the deep sinus in the hind margin of the wing.

Rhaphium steyskali, n. sp.
(Figs. 5–6)

Male.—Length 5.3 mm; wing 4.0 mm by 1.5 mm.

Face long and narrow, becoming wider above, covered with white pollen; front broad, slightly wider above, metallic green with thin whitish pollen; palpus apparently yellow with pale hairs; proboscis brown. Antenna (fig. 5) brown with segment 1 yellow below; segment 1 widened distally to as wide as long, bare above; segment 2 very short, about as wide as first, ringed by submarginal black setulae; segment 3 about as long as face, elliptical, covered with fine pale hairs, with darker strand along dorsal margin ending at insertion of arista; arista slightly preapical, about as long as segment 3. Upper postocular setae black, lateral and lower postocular surface covered with long white hairs.

Thorax metallic green with mesoscutum very shining, thin whitish pollen evident toward margins and on pleura. Setae black; acrostichals short, biseriate; 5

pairs of long dorsocentrals; scutellum with a pair of long widely-separated bristles, a smaller bristle on each lateral margin; proepisternum covered with short pale hairs.

Coxae yellow, base of middle coxa slightly darkened externally, segments of fore and middle tarsi with brownish tips, dorsal margin of hind femur darkened distally, hind tibia brownish yellow and becoming brownish distally, hind tarsus dark brown, legs otherwise pale. Fore and middle coxae with numerous pale hairs on anterior surface, fore coxa without black setae, middle coxa with a cluster of black setae forming an apical thorn, middle and hind coxae with a long black external seta; posterior surface of fore femur with many rather long pale hairs, some pale hairs on hind surface of middle femur toward base, other setae of legs mostly black; femora without distinct preapicals; fore tibia with pair of small dorsals near basal fourth, small posterodorsal near middle, 1 distinct apical; middle tibia with 1 stout anterodorsal near base, smaller one beyond middle, 1 small posterodorsal near middle, 5 apicals; hind tibia with pair of short stout dorsals near middle, 1 anterodorsal near base, 1 posterodorsal near second fifth, 2 strong apicals. Lengths of segments of fore tarsus from base as 12-4-3-2-2; middle tarsus as 15-7-5-3-2; hind tarsus as 10-12-8-5-3.

Wing elongate oval, hind margin rather oblique distally, surface tinged with brown especially distally, veins brownish; vein 2 reaching twice as far along costa as vein 1, nearly straight; vein 3 nearly straight and parallel with 2 but curving gradually backward near tip; vein 4 slightly offset forward in middle of last part, nearly parallel with 3 at tip; crossvein nearly perpendicular to base of vein 5, two-thirds as long as last of vein 5; vein 6 represented by a strong fold that bends backward in middle. Calypter, its long setae, and halter pale.

Abdomen considerably longer than thorax, tapering, metallic green with slight whitish pollen on sides; long pale setae on sides of basal terga, long black setae along hind margins. Hypopygium (fig. 6) brown, rather small, extending slightly forward under preabdomen, tips prolonged into smooth light brownish rods; lamellae strap-like, acute apically, brown, with dark setae over outer surface, a few pale setae at tip.

Holotype ♂, Sweetwater Creek near old "Camp Torreya," Liberty Co., Florida, Mar. 23, 1954, George Steyskal. Specimen in USNM, no. 69333.

The new species would key to *Rhaphium insolitum* Curran but differs by having a much more massive third antennal segment and a much longer strap-like hypopygial lamella. The new species is the only *Rhaphium* known to me having a preapical arista.

Diaphorus bakeri, n. sp.
(Figs. 11–12)

Male.—Length 2.7 mm; wing 2.7 mm by 1.1 mm.

Face about as wide as long; front triangular below, obliterated in upper half; both face and front brown with slight grayish pollen; palpus brown with a few dark hairs and a black apical seta; proboscis brown. Antenna brown, all segments of nearly equal length; segment 1 distally about as wide as long, bare above; segment 2 slightly wider than first, ringed by small setulae of which one above

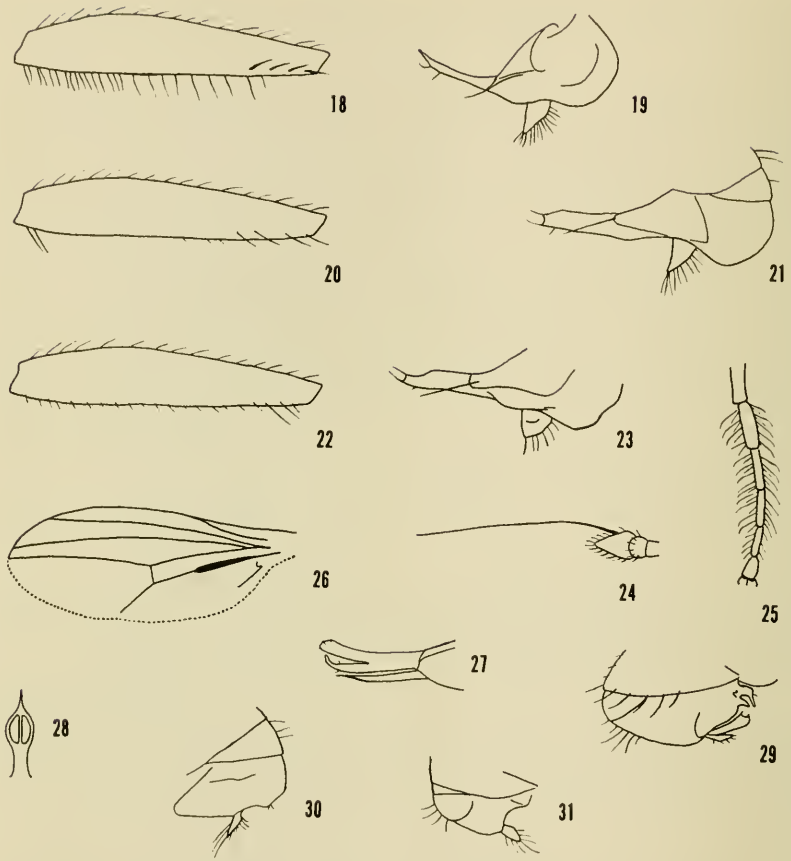

Fig. 18–31. Dolichopodidae, males. *Chrysotus picticornis* Loew. 18, hind femur; 19, hypopygium. *Chrysotus mexicanus* n. sp. 20, hind femur; 21, hypopygium. *Chrysotus neopicticornis* n. sp. 22, hind femur; 23, hypopygium. *Telmaturgus costaricensis* n. sp. 24, antenna; 25, fore tarsus. *Medetera marylandica* n. sp. 26, wing; 27, hypopygial appendages; 28, tip of aedeagus, ventral view. *Chrysotimus arizonicus* n. sp. 29, hypopygium. *Chrysotimus obscurus* n. sp. 30, hypopygium. *Chrysotimus metallicus* Parent. 31, hypopygium.

is rather long; segment 3 nearly twice as wide as long, covered with numerous fine pale hairs, with arista inserted near upper margin and with distal margin slightly produced below arista. Lower postocular surface covered with long black hairs.

Thorax brown, with slight yellowish pollen above, more grayish pollen on pleura. Mesoscutum rather strongly arched; bristles black; acrostichals small, biseriate; 5 pairs of dorsocentrals; 1 pair of long scutellars, a small seta on each lateral margin; a few small setae above the fore coxa.

Legs brown. Hairs and bristles black; fore and middle coxae with numerous black hairs on the anterior surface, fore coxa with larger setae on distal margin, middle and hind coxae with a large external bristle; fore femur with hairs on ventral surface of thickest part rather erect, with a row of prominent setae along anteroventral surface, hind femur with numerous long hairs along posteroventral surface and a few stiff hairs anteroventrally near tip, preapical bristles lacking; fore tibia with 1 very small anterodorsal near basal third; middle tibia with 2 anterodorsals and 2 posterodorsals all small, 4 large apicals; hind tibia with 2 small but distinct anterodorsals, 4–5 posterodorsals, 4 apicals. Lengths of segments of fore tarsus from base as 14-7-5-4-3, with tibia as about 23, pulvilli nearly as long as segment 5; middle tarsus as 16-8-6-4-3, pulvilli scarcely enlarged; hind tarsus as 11-9-6-4-3, pulvilli not enlarged.

Wing rather oval with basal part very broad, hind margin only slightly curved from middle to near tip of vein 4; surface with brownish tinge and brown veins; vein 1 reaching about half way from base to tip of vein 2; veins 2, 3, and 4 nearly straight and parallel beyond the crossvein, vein 3 only slightly more curved backward toward the tip; crossvein perpendicular to basal part of vein 4, about three-fifths as long as last of vein 5; vein 6 represented by slight fold. Calypter and halter brownish, setae of former black.

Abdomen longer than thorax, brown with slight yellowish gray pollen toward the sides and base; hairs and bristles black, longer toward the sides. Hypopygium (figs. 11, 12) brown, small, capping tip of preabdomen, with 4 large bristles projecting posteriorly from near base; hypopygium bearing straight slender arms with a swelling on middle of inner surface, a flange above forming a short hood, with a narrow setiferous appendage and a median hooked appendage between the arms reaching about half of length of arms.

Holotype ♂, from Olga, Washington, July 9, 1926, C. F. Baker. Specimen in USNM, no. 69334.

The new species would key to *Diaphorus nigricans* in the treatment of southeastern Dolichopodidae, but differs most noticeably by the presence of prominent setae posteroventrally on the hind femur. These setae plus the longer first wing vein provide distinctions from *D. fuscus*, and the lack of enlarged pulvilli on the middle and hind tarsi provide a further distinction from *D. snowi*. I have included illustrations of hypopygia of some of the related species having yellow tibiae; *D. pseudopacus* Robinson, figs. 7–8; *D. canus* Robinson, figs. 9–10; *D. gibbosus* Van Duzee, figs. 13–14.

Chrysotus neopicticornis, n. sp.
(Figs. 22–23)

Male.—Length 2.1 mm; wing 2.1 mm by 0.9 mm.

Eyes essentially contiguous below the middle of the face, face narrow above mouth, covered with yellowish pollen; front broad, slightly broader above, metallic green with slight yellowish pollen; palpus yellow; proboscis yellowish brown. Antenna with first and most of second segment yellow, upper part of second and most of third segment brown; segment 1 bare above; segment 2 about as long as

but distally wider than first, with a submarginal ring of dark setulae; segment 3 longer than second, half again as long as wide, with arista in slight apical sinus. Lower postocular setae pale.

Thorax metallic green dulled with yellowish pollen above, with thicker whitish pollen on pleura. Setae black; acrostichals biseriate; 5 pairs of dorsocentrals; a pair of large scutellars, a small scutellar hair on lateral margin; a pale seta above fore coxa.

Legs mostly pale, middle coxa and base of hind coxa brownish. Setae mostly dark; many long pale setae on anterior surface of fore and middle coxae, hind coxa with a rather dark external bristle; fore femur with a series of prominent posteroventrals (distal ones longer), ventral setae paler toward base of femur; middle and hind femora with rather short pale ventral setae, those of hind femur evenly spaced, hind femur (fig. 22) with 2–3 brownish anteroventral bristles near tip; middle tibia with 1 strong anterodorsal and 1 weak posterodorsal near basal third, a very small bristle in each dorsal row beyond middle, 3 distinct apicals; hind tibia with 2 rather strong anterodorsals and 3 smaller posterodorsals rather evenly spaced, 2 apicals and 1 subapical. Lengths of segments of fore tarsus from base as 8-4-3-2-2; middle tarsus as 9-4-3-2-3; hind tarsus as 7-5-4-3-3.

Wing rather oblong oval, clear with brownish veins; veins 3 and 4 nearly parallel beyond crossvein, vein 2 only slightly diverging; crossvein perpendicular to last of vein 4, almost half as long as last of vein 5; vein 6 represented by a slight fold. Calypter and halter pale, setae of former pale brownish.

Abdomen only slightly longer than thorax, metallic green with slight pollen which is more yellowish above; setae mostly short with rather pale reflections, a few slightly longer and darker near tergal margins. Hypopygium (fig. 23) small, enclosed in tip of preabdomen; outer appendages small, pale; inner appendages primarily a pair of stout dark armatures with a blunt tip bearing 2 short but distinct setae.

Face of female wide, about half as wide as high; palpus with numerous black hairs. Setae on anterior surface of fore coxa much shorter, no long or distinctive setae ventrally on femora; setae of hind tibia generally stronger.

Holotype ♂ and allotype ♀, from soil of earth dam, wooded area about 3 miles north of Spartanburg, South Carolina, May 8, 1961; 2 ♂ paratypes, soil by stream, University of Tennessee Farm, Knox Co., Tennessee, July 18 and Aug. 11, 1957, all H. Robinson; 1 ♀ paratype, Duke Garden, Durham Co., North Carolina, April 28, 1959, H. S. Daoud; 1 ♂, Canton, New York, July 27, 1931; 2 ♂, Vincennes, Indiana, June 6; 2 ♂, Lafayette, Indiana, June 1 and 27, all J. M. Aldrich. Holotype (no. 69335), allotype, and the Aldrich collections in USNM; others presently in my collection.

For discussion see following species.

Chrysotus mexicanus, n. sp.
(Figs. 20–21)

Male.—Length ca. 2.0 mm; wing ca. 2.0 mm by 0.9 mm.

Head, thorax, legs except hind femur, wing, and preabdomen essentially as

described for *C. neopicticornis*. Ventral margin of hind femur (fig. 20) with sparse pubescence, at base bearing a pair of distinct black setae that are very close and often adhere to each other. Hypopygium as illustrated (fig. 21).

Holotype ♂, allotype ♀, 6 ♂, 2 ♀ paratypes, from km 375, rt. 180, Veracruz, Aug. 7; 2 ♀ paratypes, soil by stream, near Santiago Tuxtla, Veracruz, Aug. 8, 1962; 1 ♂ and 2 ♀ paratypes, near Tierra Blanca, Veracruz, May 12, 1963; 3 ♂ and 2 ♀ paratypes, edge of shaded stream, Tuxtepec, Oaxaca, May 12; 1 ♀, above Rio Valle Nacional, Oaxaca, May 14, 1963; 1 ♂, near Jaltepec River, rt. 185, Oaxaca, Aug. 8; 3 ♂ and 1 ♀, near km 220, rt. 185, Oaxaca, Aug. 9, 1962; 4 ♂ and 1 ♀, El Salto, San Luis Potosi, May 9; 7 ♂ and 1 ♀, near junction of rts. 190, 200, Chiapas, May 21; 2 ♂ and 1 ♀, just below crest of Sierra above Arriaga, Chiapas, May 22; 1 ♂, Rio Lajas, Chiapas, May 23, 1963; all from Mexico collected by H. Robinson; 3 ♂ and 1 ♀, Clarke Hall, Dominica, Jan. 22–23; 2 ♂, near Layou River mouth, Mar. 10, 1964, H. Robinson; 6 ♂ and 3 ♀, Layou River mouth, Jan. 9; 1 ♂, same location, Mar. 8; 5 ♂ and 1 ♀, same location, Mar. 18–24; 7 ♂ and 2 ♀, Cabrit Swamp, Mar. 22–25; 4 ♂ and 1 ♀, Clarke Hall, Malaise and light traps, Jan. 8–Mar. 31; all 1964 collected by W. W. Wirth; 1 ♂, Clarke Hall, May 28; 1 ♂, Melville Hall Airport, July 14, 1966, George Steyskal; the latter all from Dominica collected during participation in the Bredin–Archbold–Smithsonian Biological Survey of Dominica. Holotype (no. 69336), allotype, and the Dominica collections in USNM; others presently in my collection.

After careful examination of the *Chrysotus picticornis* complex I find three distinct species are involved. Those specimens having a distinct dark spot and four or more distinct black bristles near the tip of the hind femur and rather dense pale pubescence ventrally near the base of the femur, are *C. picticornis*. In this species the hypopygial armature is very slenderly pointed. The two new species lack the distinctly dark tip on the hind femur and the anteroventral preapical setae are less distinct (sometimes only 1 present). Of the two new species, *C. mexicanus* is easily distinguished by the pair of black ventral bristles at the base of the hind femur. The hypopygial armature of *C. mexicanus* seems rather variable, in one specimen from Chiapas (near Arriaga) the armature is very broad and is curved on the lower edge, in specimens from Dominica the armature is very slender. Though the range of *C. picticornis* in the Neotropics is not as extensive as previously believed, I have collected specimens near Jitotol in Chiapas, Mexico.

Chrysotus clypeatus, n. sp.
(Figs. 15–17)

Male.—Length 2.0 mm; wing 2.1 mm by 0.7 mm.

Face (fig. 16) very broad, becoming broader below, terminating at suture with

the broad and bluntly pointed clypeus greatly recessed from the plane of the face, covered with silvery white pollen; front slightly broader than upper part of face, dark brownish with thin yellowish pollen; palpus rounded-oblong, nearly as long as face, covered with silvery white pollen; proboscis small, brown. Antenna (fig. 17) brown; segment 1 very small, bare above; segment 2 larger but hardly longer, ringed by short brownish setulae; segment 3 triangular, slightly longer than wide, covered with fine pale pubescence, with arista borne just before apex. Lower postocular surface with many pale setae.

Thorax dark brownish, with slight yellowish pollen above, whitish pollen toward sides and on pleura. Setae black; acrostichals small, biseriate; 6 pairs of dorsocentrals, hind pair long; 1 pair of long scutellars, a small seta on lateral margin of scutellum; 1–2 pale setae above fore coxa.

Legs brown with fore and middle trochanters, all tibiae, and all but tips of basitarsi pale. Fore and middle coxae with pale setae on anterior surface; middle coxa with a brownish setae toward outside, hind coxa with black external seta; femora without preapical setae, a few prominent antero- and posteroventrals near tip of hind femur; fore tibia without distinctive setae; middle tibia with 1 strong anterodorsal near base, 1 very small ventral, 4 apicals; hind tibia with 2 small anterodorsals, 4 small posterodorsals, 4 stronger apicals. Lengths of segments of fore tarsus from base as 9-4-3-2-2; middle tarsus as 11-5-3-2-2; hind tarsus as 8-6-4-2-2.

Wing rather oblong, clear, veins brown; veins 3 and 4 parallel, curving slightly backward; crossvein near midwing, perpendicular to anterior wing margin, about two-thirds as long as last of vein 5.

Abdomen cylindrical, slightly longer than thorax, dark metallic brownish green; marginal setae of tergum 6 projecting, but not longer than setae of other terga. Hypopygium (fig. 15) small, embedded in tip of preabdomen, bare, brown; lamellae minute, brownish, pale pubescent.

Holotype ♂, Port St. Joe, Gulf County, beach, Florida, Mar. 17, 1954, George Steyskal. Specimen in USNM, no. 69337.

The new species seems most closely related to *Chrysotus lamellifer* Robinson, which has the same type of unusual clypeus, but *C. lamellifer* is a somewhat larger species with a short rather reniform third antennal segment and with a distinct ventral bristle on the hind basitarsus.

Telmaturgus costaricensis, n. sp.
(Figs. 24–25)

Male.—Length 1.8 mm; wing 2.0 mm by 0.8 mm.

Face very narrow, essentially obliterated in lower half; front broad, broader above, dark with violet reflections, with very slight pollen; palpus and proboscis brown. Antennal segments (fig. 24) 1 and 2 small, yellowish; segment 3 brown, triangular, half again as long as wide; arista dorsal from near base of third segment, plain. Postocular setae small, brown.

Thorax evenly rounded above, dark brownish above with violet reflections, only slightly pollinose; pleura yellowish. Acrostichals uniseriate, absent posteriorly; 4 pairs of large black dorsocentrals, posterior pairs largest, an anterior 5th pair very small; scutellum with 1 pair of bristles, no hairs.

Legs yellowish with dark setae. Middle femur with preapical bristles anteriorly and posteriorly; hind femur with both upper and lower preapicals anteriorly; middle tibia with antero- and posterodorsals paired near basal third, 1 anterodorsal near distal third, 2 apicals; hind tibia with a few short indistinct dorsals, 2 very small ventrals. Lengths of segments of fore tarsus (fig. 25) from base as 8-6-5-5-3, segment 1 slightly thickened, all segments bearing very long curved setae along antero- and posteroventral surfaces; middle tarsus as 11-9-6-4-4; hind tarsus as 6-11-7-4-3.

Wing elongate oval, slightly brownish tinged, veins brown; veins 3 and 4 essentially parallel beyond the crossvein, vein 2 diverging slightly forward; crossvein a little over half as long as last of vein 5; vein 6 represented by slight fold. Calypter, its setae, and knob of halter brown.

Abdomen slightly longer than thorax, cylindrical, brownish with slight violet reflections; setae dark. Hypopygium small, set on tip of preabdomen, brown with small brown appendages.

Holotype ♂, La Suiza de Turrialba, Costa Rica, April 1922, Pablo Schild. Specimen in A. L. Melander collection in USNM, no. 69338.

The new species differs from *Telmaturgus parvus* (Van Duzee) of the Eastern United States by the presence of 4 pairs of dorsocentrals; it differs from *T. tumidulus* (Raddatz) of Europe by the plain arista and the differently shaped fore tarsus.

Lamprochromus occidentalis, n. sp.

Male.—Length 2.0 mm; wing 2.0 mm by 0.8 mm. Setae mostly black.

Face wide above, gradually becoming very narrow below, covered with silvery white pollen; front broad, broader above, shining dark green; palpus small, brown; proboscis brown. Antenna black, all segments short and about as long as wide; segment 1 bare above; segment 2 with a ring of setulae and 1 long dorsal seta; segment 3 pointed, with a dorsal arista. Lower postocular setae pale.

Thorax bright metallic green with a violet stripe along middle of mesoscutum, a patch of velvety black above wing base; grayish pollen on pleura. Acrostichals biseriate; 4 pairs of dorsocentrals; 1 pair of strong scutellars, a small hair on lateral scutellar margin; proepisternum with a few pale setulae before anterior spiracle.

Middle and hind coxae slightly brownish basally, fore and middle tarsi rather darkened distally, hind leg brown except basal third of femur, legs otherwise pale. Fore coxa with numerous small pale hairs and distally with black setae on anterior surface; middle and hind coxae with a large seta toward the outer surface; middle and hind femora with preapical bristles; fore tibia with 1 small anterodorsal near base; middle tibia with 2 small anterodorsals, 2 larger posterodorsals, 4 apicals; hind tibia with 2 strong anterodorsals, many large posterodorsals of which some are quite prominent, 3 apicals. Lengths of segments of fore tarsus from base as 9-4-3-2-2; middle tarsus as 11-7-5-3-3; hind tarsus as 9-10-5-3-5.

Wing rather oval, slightly brownish; veins 2, 3, and 4 curving only very slightly backwards, veins 3 and 4 essentially parallel beyond crossvein; crossvein perpendicular to base of vein 4, two-thirds as long as last of vein 5; vein 6 represented by a slight fold; anal angle only moderately rounded.

Abdomen longer than thorax, cylindrical; wholly metallic green. Hypopygium capping tip of preabdomen, dark with small brownish appendages.

Holotype ♂, from Wells, Nevada, July 12, 1911; 1 ♂ paratype, from Juliaette, Idaho, July 5, 1930; both J. M. Aldrich. Specimens in USNM, no. 69339.

The new species differs from others known from North America by the wholly metallic abdomen. It differs from European species by the short pointed antenna and the almost wholly brownish hind leg.

Medetera marylandica, n. sp.
(Figs. 26–28)

Male.—Length ca. 2.0 mm; wing 2.0 mm by 0.7 mm.

Face narrow below, metallic dark green, slightly dulled by yellowish white pollen; front broad, broader above, slightly more pollinose than face; head strongly excavated behind vertex; palpus and proboscis black. Antenna blackish, all segments short, segment 3 truncate with an apical arista. Postocular setae black with pale reflections.

Thorax strongly arched with strongly flattened posterior slope, dark metallic green dulled with grayish pollen. Acrostichals biseriate, absent posteriorly; 4 pairs of large black dorsocentrals becoming progressively smaller and grading into hairs anteriorly; 4 scutellar bristles, lateral pair small; proepisternum with a few small black setae below.

Legs with fore and middle knees and tibiae, basal joints of fore and middle tarsi yellow, hind tibia yellowish brown, remainder of legs brown. Setae brownish, all but larger with pale reflections; middle femur with numerous longer setae along anteroventral surface in distal half; hind femur with 2 bristles toward tip in middle of anterior surface; middle tibia with small anterodorsal and smaller posterodorsal paired near basal third. Lengths of segments of fore tarsus from base as 10-4-3-2-4; middle tarsus as 14-6-4-3-2; hind tarsus as 8-10-6-3-4, basitarsus with a deep prominently rimmed pocket basally on inside surface.

Wing (fig. 26) rather oval, clear, veins brown; vein 2 and last of vein 4 nearly parallel, vein 3 curving backward and ending near vein 4; base of vein 5 thickened for nearly two-thirds its length; crossvein slightly over half as long as last of vein 5; vein 6 represented by slight fold. Calypter and halter pale, setae of calypter brownish.

Preabdomen about as long as thorax, strongly tapered, metallic blackish green with slight yellowish white pollen; terga bearing small black marginal bristles. Hypopygium pedunculate, black; appendages (fig. 27) yellow, lateral lamella deeply cleft, aedeagus (fig. 28) slender with a preapical enlargement.

Holotype ♂, Bethesda, Montgomery Co., Maryland, July 24, 1965, George Steyskal. Specimen in USNM, no. 69340.

The new species seems closest to *Medetera freyi* E. Thuneb. of Europe in the shape of the genitalia, more like *M. excellens* Frey in leg color. Of these the former has a much shorter thickened area on the fifth vein and the latter has much paler pubescence. The only previously known North American species with a thickened fifth vein, *M.*

crassivenis Curran, has the last part of the fifth vein hardly half as long as the crossvein, and has a hind femur with more and longer hairs anteriorly but no bristles.

Chrysotimus arizonicus, n. sp.
(Fig. 29)

Male.—Length 2.0 mm; wing 2.6 mm by 1.0 mm. All hairs and bristles pale.

Face broad with sides nearly straight and parallel, metallic green with slight gray pollen; front broad with sides diverging from below, metallic green with yellowish pollen; palpus yellow with a number of hairs; proboscis brown. Antenna black, with all segments short; segment 1 bare above; segment 2 ringed with small setulae; segment 3 triangular, covered with small hairs, with arista inserted near middle of the oblique dorsal margin. Lower postocular setae in single series.

Thorax metallic green except the yellow metepimeron, with yellowish pollen above, more grayish pollen on pleura; posterior slope of mesoscutum flattened. Acrostichals small, irregularly biseriate; 5 pairs of large dorsocentrals; 1 pair of long scutellars, a small seta on lateral scutellar margin; proepisternum with a few short setae above fore coxa.

Legs yellow except the black fifth segments of the tarsi. Fore and middle coxae with numerous hairs on anterior surface, fore coxa with a series of bristles on distal margin; middle and hind coxae with a strong external bristle; middle and hind femora with a preapical bristle; fore tibia without evident bristles; middle tibia with 2 anterodorsals near base and middle, a smaller posterodorsal near each, 3 apicals; hind tibia with 2 anterodorsals and 3 posterodorsals, 2 small but distinct apicals. Lengths of segments of fore tarsus from base as 9-4-3-2-2; middle tarsus as 11-5-3-2-2; hind tarsus as 8-6-4-3-3.

Wing rather oval, clear with yellow veins; veins 2, 3, and last part of 4 all very slightly curved backwards and nearly parallel to each other and to front wing margin, vein 3 slightly more curved toward tip, vein 4 ending at or just behind tip of wing; crossvein perpendicular to base of vein 4, two-fifths as long as last of vein 5; vein 6 represented by a slight fold. Calypter and halter yellow.

Abdomen only slightly longer than thorax; shining metallic green terga dulled with slight yellow pollen, sterna yellow. Hypopygium (fig. 29) brown, apparently usually partly concealed, extending forward nearly half length of preabdomen; appendages brown.

Female very similar to male except in abdomen. First 4 segments of abdomen yellow, segment 5 broad and metallic green; middle of hind margin of tergum 4 slightly indented.

Holotype ♂, allotype ♀, and 1 ♀ paratype, from Grand Canyon National Park (north rim), Arizona, July 15, 1954, W. L. Downes, Jr. Holotype (no. 69341) and allotype in USNM, paratype in the Downes collection at the Department of Entomology, University of Illinois.

The new species seems close to *Chrysotimus luteopalpus* Curran, but the antenna of the latter species is mostly yellow and the female abdomen has the fifth tergum yellow and margins of the other terga plain.

Chrysotimus schildi, n. sp.

Male.—Length 1.5 mm; wing 2.0 by 0.8 mm. Hairs and bristles mostly yellow, verticals, ocellars, and anterior dorsocentrals brownish.

Basic characters as in *C. arizonicus* but antennae yellow with an apical arista; only center of mesoscutum bright metallic green, thorax otherwise yellow; hind tibia with only 1 obvious anterodorsal, posterodorsals very small and indistinct; lengths of segments of fore tarsus from base as 13-6-5-3-3, middle tarsus broken off, hind tarsus as 11-9-6-4-3; wing vein 4 ending slightly behind wing tip; abdomen yellowish on lateral margins of terga, pale brownish below; hypopygium brownish with greenish reflections, of structure similar to *C. obscurus* & *C. metallicus*, bases of appendages yellow.

Female abdomen with tergum 1, all but central posterior triangle of tergum 3, and sides of tergum 4 yellow.

Holotype ♂ and allotype ♀, La Suiza de Turrialba, Costa Rica, April, July 1922, Pablo Schild. Specimens in A. L. Melander collection in USNM, no. 69342.

The species is readily distinguished by the dorsal spot of metallic green on the mostly yellow thorax.

Chrysotimus obscurus, n. sp.
(Fig. 30)

Male.—Length 1.8 mm; wing 2.3 by 1.0 mm.

Similar to *C. arizonicus* but hairs and bristles of body brownish, those of legs more yellowish; head and thorax including metepimeron much darker metallic green, abdomen brownish with green reflections (hypopygium as in fig. 30); front and mesoscutum with light grayish pollen; palpus black; antennal segment 3 very blunt with an essentially apical arista; acrostichals distinctly biseriate; coxae except tips and hind femur except extreme base and tip brown; middle tibia with 2nd anterodorsal near distal third, 1–3 posterodorsals; lengths of segments of fore tarsus from base as 8-4-3-2-2, middle tarsus as 10-5-4-2-2; hind tarsus as 8-6-4-3-2; wing veins brownish yellow, vein 4 ending slightly behind wing tip, crossvein perpendicular to last of vein 4; setae of calypter brownish.

Holotype ♂ and 1 ♂ paratype, from roadside foliage, rain forest, Sierra Juarez above Rio Valle Nacional, Oaxaca, Mexico, May 17, 1963, H. Robinson. Holotype in USNM, no. 69343; paratype presently in my collection.

Chrysotimus obscurus seems close to such species as *C. pusio* Loew and *C. metallicus* Parent, but is distinct by the brownish coxae and hind femur and the blunt third antennal segment with an apical arista. *Chrysotimus metallicus* has brownish bristles as in *C. obscurus*, but the anterior wing margin is more curved and the second and fourth veins are less distinctly parallel. The female of *C. pusio* has a partly yellow abdomen as is common in the genus, but *C. obscurus* may prove to be more related to *C. metallicus*, in which the female abdomen is entirely metallic green.

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FURTHER STUDIES ON THE TARSONEMIDAE
(ACARINA)

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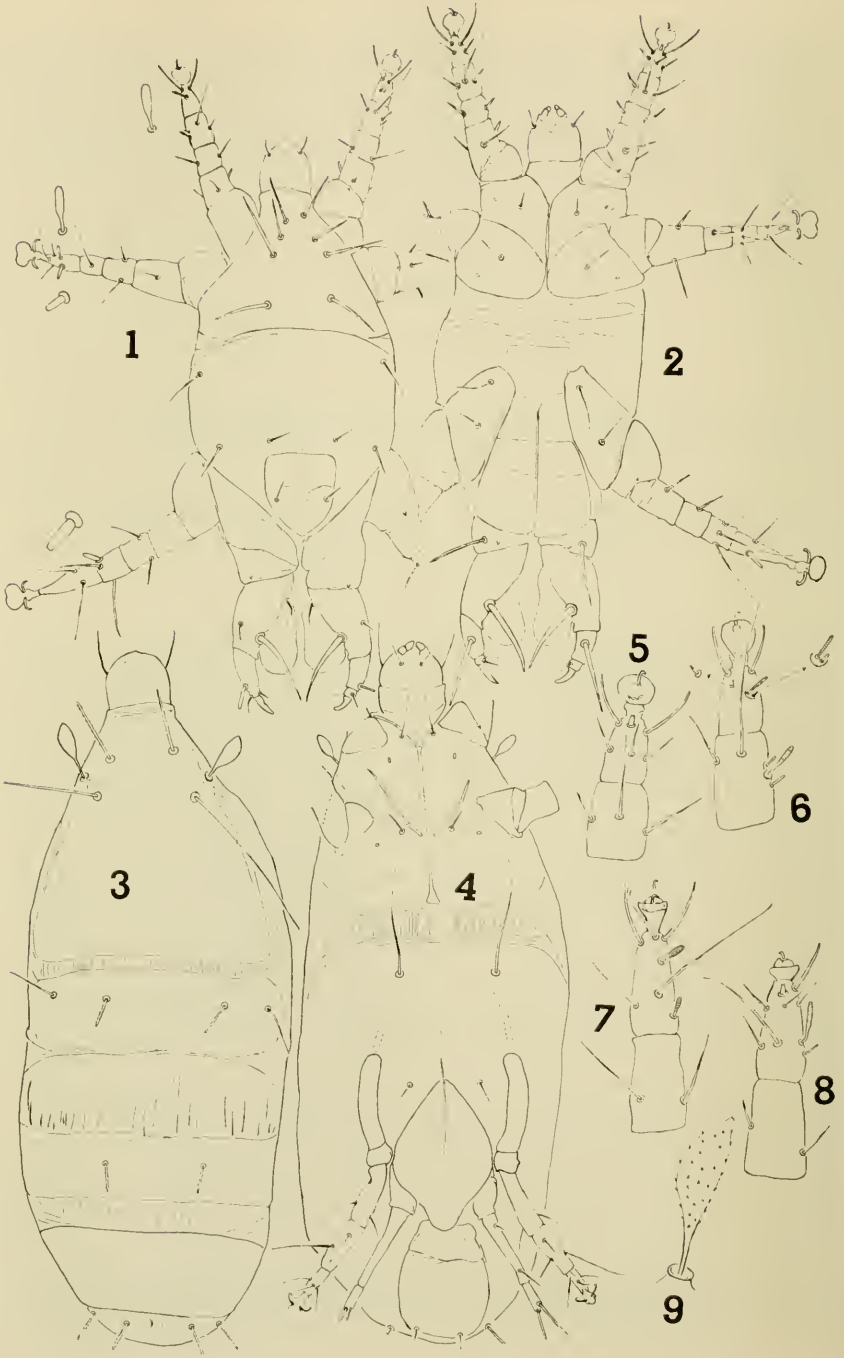
In a continuation of studies on the Tarsonemidae (Smiley, 1964), a family of mites of importance to agriculture, I here describe one species belonging to the genus *Hemitarsonemus* Ewing, two species to the genus *Steneotarsonemus* Beer, and two species to the genus *Tarsonemus* Canestrini as new from material in the U. S. National Museum collection. All are from the Western Hemisphere. Also included in this study are five new species of tarsonemids collected from various areas in the South Pacific and submitted for determination by D. M. C. Manson of the Horticultural Research Centre, Department of Agriculture, Levin, New Zealand. This collection is represented by the following genera: *Hemitarsonemus* Ewing (one species), *Tarsonemella* Hirst, and *Tarsonemus* Canestrini (four species). The genus *Neotarsonemus* is here erected to include the two species, *Hemitarsonemus latus* (Banks) and *H. beeri* Smiley in which legs IV of the males possess terminal claws which are reduced to a ball-like process. The genus *Fungitarsonemus* Cromroy (1958) is here synonymized with the genus *Hemitarsonemus*. Ewing (1939) and Beer (1954) give an excellent historical account of the confusion and errors made previously in the genus *Hemitarsonemus* and perpetuated by former acarologists. It is hoped that this present generic arrangement will alleviate past and future errors.

A key is presented for the males of species belonging to *Hemitarsonemus*. *Tarsonemella* is reviewed, and additional morphological characters are supplied for the genus as well as for *T. beameri* Beer.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Steneotarsonemus spinki, n. sp.
(Figs. 1–9)

The male of this species is characterized by the presence of a pair of dagger-shaped setae on femur and genu IV, and a short, stout, blunt spurlike seta on tibia III.

Male. Body elongate and broadest in anterior region of hysterosoma. Dorsal propodosomal setae simple, short, stout, slightly dagger-shaped; third pair of propodosomals longest, one-third longer than first pair; second pair shortest; fourth pair slightly longer than first pair. Hysterosoma with three rows of simple setae; first row with single pair of lateral setae; second row with two pairs of setae; third row with single pair of setae; setae of first row longest, setae of other rows more or less equal in length. Ventral propodosomal and hysterosomal setae subequal in length; coxae I with single pair of setae, slightly shorter than single pair on coxae II; coxae III with two pairs of setae subequal in length, and slightly longer than setae of coxae I and II; coxae IV with pair of dagger-shape setae. Ventral apodemes as figured. Legs I and II similar in size and length; genu I with a rodlike solenidion similar to solenidion on tibia II but without spurlike seta; legs III longest, with spurlike seta stouter and longer than spurlike setae of legs I and II; leg IV as figured. Femur with large inner median lateral flange; inner anterior and outer median setae short and of equal length; posterior inner seta about as long as segment, strong, dagger-shaped; genu with daggerlike ventral seta similar to that on femur, and with distal rodlike solenidion; tibia–tarsus short, with two tiny inner setae and stout ventrally curved claw. Body 217 μ long by 121 μ wide.

The female associated with the above male is similar in having a long rodlike solenidion dorsally on tarsus I and a bifurcate spurlike seta on the distal ventral surface.

Female. Body elongate, broadest in region of hysterosoma. Propodosomal shield trapezoidal, bearing two pairs of setae; first pair slightly serrate, about one-third as long as second pair, second pair about two thirds as long as shield; pseudostigmatic organs ovoid, bearing small spurlike projections, pedicel as long as expanded distal portion. Dorsum of hysterosoma with five distinct transverse segments; first segment with two pairs of setae, outer pair simple and longer than the inner serrate pair; second segment without setae; third segment without simple setae but with two inner serrate setae subequal to the pair of the first segment; fourth segment without setae; fifth segment with two pairs of serrate setae. First pair of ventral apodemes Y-shaped, converging with the anterior median apodeme; a pair of simple setae adjacent to the first pair of apodemes; apodemes II longer and stronger, with a pair of simple setae which are shorter than the anterior pair; posterior median apodeme not converging with apodeme III and transverse apodeme; apodeme III obscure, and above these, a pair of long simple setae; apodeme

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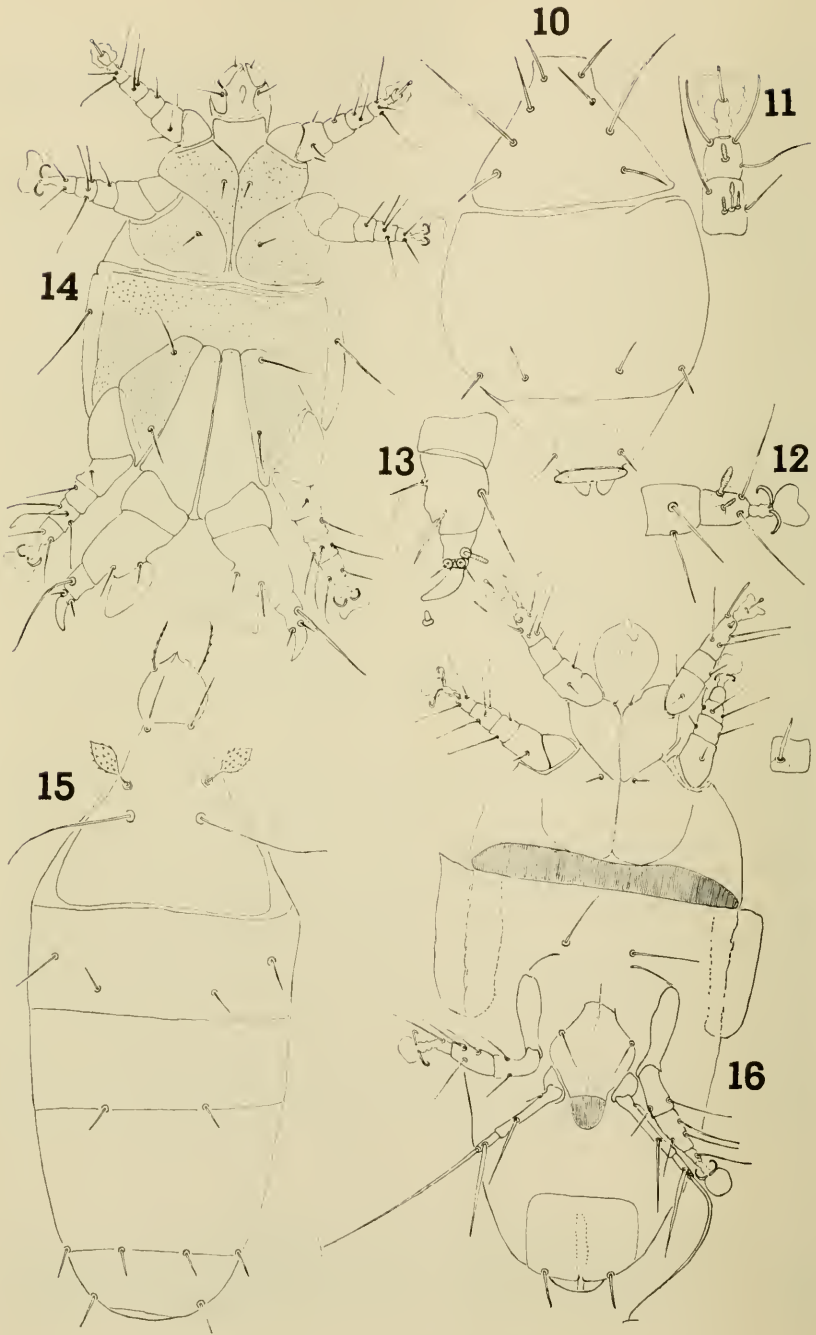
Steneotarsonemus spinki, new species. Fig. 1, dorsum, male; fig. 2, venter, male; fig. 3, dorsum, female; fig. 4, venter, female; fig. 5, ventral, tibia and tarsus I, male; fig. 6, dorsal, tibia and tarsus I, male; fig. 7, dorsal, tibia and tarsus I, female; fig. 8, ventral, tarsus and tibia II, female; fig. 9, pseudostigmatic organ, female.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IV converging with genital plate, and with a pair of simple setae subequal in length to the pair on apodeme II. Legs robust, as figured. Body 274 μ long by 108 μ wide.

The male holotype, USNM 3148, and a female paratype were collected on *Sogata orizicola* Muir, a planthopper, Baton Rouge, La., November 18, 1960, by W. T. Spink, for whom this species is named.

Steneotarsonemus friedmani, n. sp.
(Figs. 10–16)

The large empodium on legs I–III and the ventral body striations will separate this species from other known members of the genus.

Male. Body elongate oval, broadest in anterior region of hysterosoma. Propodosomal shield trapezoidal; with four pairs of simple setae, first pair shortest; second pair two-thirds length of third pair, slightly blunt apically; third pair longest; fourth pair subequal to second pair, saberlike and pointed distally. Hysterosoma with two pairs of simple setae subequal in length located in the region of metapodosoma, about one-half length of fourth pair of propodosomals; posteriorly with a single pair of simple setae subequal to anterior pair. Ventral propodosomal setae and apodemes as figured; apodeme I converging with anterior median apodeme; apodeme II not converging with anterior median nor transverse apodeme; apodeme I, the inner coxal condyles, anterior median, and apodemes II forming heart-shaped figure; striation for the heart-shaped figure as figured. Venter of hysterosoma as figured; the striae dotlike and stronger in anterior region, with some longitudinal striation, becoming smaller and dense below this region and on coxae III. Legs robust as figured. Body 223 μ long by 114 μ wide.

Female. Body elongate, broadest at propodosomal and hysterosomal suture. Propodosomal shield trapezoidal, bearing two pairs of simple setae; first pair one-half length of second pair; second pair about two-thirds as long as shield; pseudostigmatic organs ovoid, bearing small spurlike projections; pedicel as long as expanded distal portion. Dorsal capitulum about as long as broad, with a pair of serrated setae. Dorsum of hysterosoma with four segments; first segment with two pairs of simple setae, outer pair one-fourth longer than inner median pair; second segment with a pair of inner median setae subequal to pair on the first segment; third segment with two pairs of simple setae (a lateral and median) subequal in length to those of segments I and II; fourth segment with only a pair of lateral simple setae subequal in length and size to those of segments II and III. Ventral surface as figured. Legs I–III strong and robust; with large empodia and claws; leg IV extending to margin of the body and terminating in a whiplike seta two times the length of the leg. Body 300 μ long by 121 μ wide.

The male holotype, USNM 3167, four paratype males and seven females were collected in leaf sheath of unidentified grass, Van Cort-

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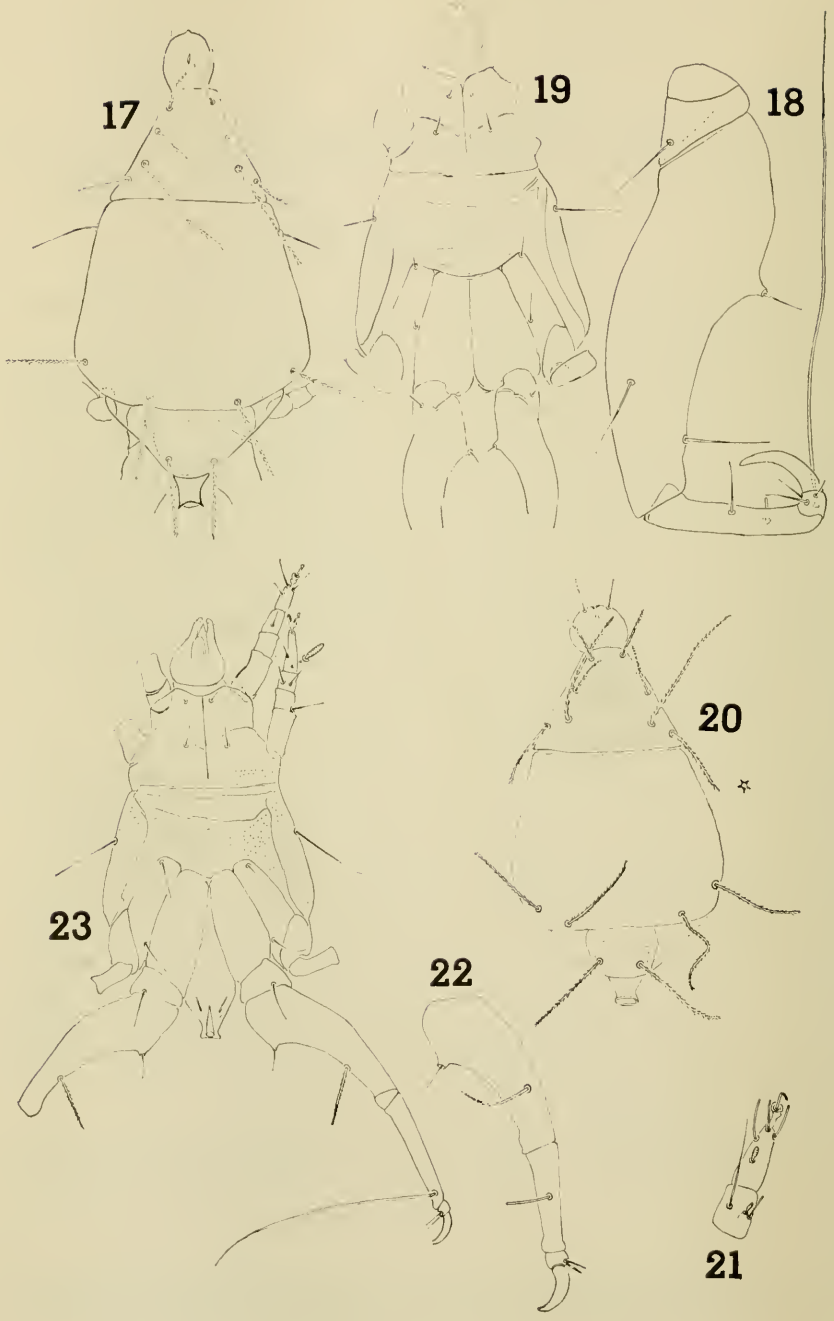
Steneotarsonemus friedmani, new species. Fig. 10, dorsum, male; fig. 11, dorsal, tarsus and tibia I, male; fig. 12, dorsal, tarsus and tibia II, male; fig. 13, leg IV, male; fig. 14, venter, male; fig. 15, dorsum, female; fig. 16, venter, female.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landt Park, Bronx, New York, May 5, 1965, by W. Friedman, for whom this species is named.

Hemitarsonemus leonardi, n. sp.
(Figs. 17–19)

Three distinctive characters readily separate this species from other known members of this genus. These are: the dorsal serrate setae, the long stout claw of leg IV, and the slightly sclerotized lateral plates on the venter of the hysterosoma. Only the male is known.

Male. Body slightly elongate, broadest in region of the metapodosoma. Propodosoma trapezoidal and bearing near lateral margins four pairs of serrate setae; first and fourth pair subequal in length, second pair slightly shorter than first and fourth pair, fourth pair subequal to first pair. Hysterosoma with two pairs of equal serrate setae, stouter and subequal in length to first pair of propodosomals; and with a pair of lateral simple setae subequal in length to the two pairs of serrate setae. Opisthosoma with a pair of serrate setae equal in length to the two hysterosomal pairs. First and second pairs of ventral propodosomals equal in length. Ventral apodemes of propodosoma and hysterosoma as figured. Venter of hysterosoma with three pairs of simple setae, equal in length to the two pairs of ventral propodosomal setae; and with a slightly sclerotized plate on each side, beginning slightly posterior to the propodosomal and hysterosomal suture and extending almost to coxae III; lateral plate with a simple seta two-thirds longer than the ventral propodosomal and hysterosomal setae. Legs I and II similar in length. Leg III subequal in size and length to legs I and II. Leg IV as figured; femur with small inner median lateral protuberance bearing a simple seta and with two simple setae subequal in length below protuberance; tibia long and slender, with a short seta; tarsus short, with two simple setae and one whiplike seta longer than the leg, and with long strong, stout, curved claw. Body 185 μ long by 95 μ wide.

Female. Not known.

The male holotype, USNM 3147, was collected on *Citrus sinensis* (L.), Jamaica, March 9, 1961, by J. B. Bache-Wiig. The species is named for Dr. M. D. Leonard, of Washington, D. C.

Hemitarsonemus deleoni, n. sp.
(Figs. 20–23)

The male of this species keys out to *Hemitarsonemus peregrinus* Beer but it differs by having dorsal serrate setae.

Male. Body slightly elongate, broadest in region of metapodosoma. Propodosoma trapezoidal, slightly sclerotized and bearing near lateral margins four pairs

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Hemitarsonemus leonardi, new species. Fig. 17, dorsum, male; fig. 18, leg IV, male; fig. 19, venter, male. *Hemitarsonemus deleoni*, new species. Fig. 20, dorsum, male; fig. 21, dorsal, tarsus and tibia I, male; fig. 22, leg IV, male; fig. 23, venter, male.

of serrate setae; first and fourth pairs subequal in length; third pair longest, longer than propodosomal shield; fourth pair longer than first and second pairs but less than one-half length of third pair. Hysterosoma with two pairs of equal serrate setae, stouter and subequal in length to fourth pair of propodosomals; with a pair of lateral simple setae subequal in length to fourth pair of propodosomals. Opisthosoma with a pair of serrate setae equal in length to the two hysterosomal pairs. Apodemes I shorter than apodemes II; apodemes III and IV longer than anterior apodemes and as figured, with a lightly sclerotized lateral plate on each side, beginning slightly posterior to the propodosomal and hysterosomal suture and extending almost to coxae III; lateral plate with simple seta two-thirds longer than the ventral propodosomal and hysterosomal setae. Legs I and II similar in length, leg II with extremely large solenidion; legs III subequal in size and length to legs I and II. Leg IV as figured; femur with small inner, lateral protuberance bearing a simple seta, and a serrate seta; tibia with a long, slender sensory rod, about half the length of the tibia, tarsus about as long as broad and with large claw. Body 185 μ long by 95 μ wide.

Female. Not known.

The male holotype, USNM 3168, was collected on *Hibiscus* sp., Tonga Islands, June 15, 1965, by L. W. Burgess. This species is named for the late Dr. Donald DeLeon, who died the summer of 1966.

Key to the males of **Hemitarsonemus** Ewing

1. Without a subapical spurlike process on the inner margin of femur IV 2
   With a subapical spurlike process on the inner margin of femur IV ..... **tepidariorum** (Warburton)
2. Dorsal body setae serrated 3
   Dorsal body setae simple 4
3. Tibia IV with a long, dorsal, tactile, rodlike seta ..... **deleoni**, n. sp.
   Tibia IV with a short, dorsal, tactile, rodlike seta ..... **leonardi**, n. sp.
4. First and second pair of propodosomals not subequal in length 5
   First and second pair of propodosomals subequal in length ..... **cocosi** DeLeon
5. Second propodosomal seta not as long as the first pair of outer hysterosomal setae 6
   Second propodosomal setae about as long as the first pair of outer hysterosomal setae ..... **lodici** DeLeon
6. First outer pair of dorsal hystersomals subequal in length to the third pair of propodosomals ..... **boringuensis** (Cromroy)
   First outer pair of dorsal hysterosomals twice the length of the third pair of propodosomals ..... **peregrinus** (Beer)

Genus **Tarsonemella** Hirst, 1923

This genus differs from the other genera in the family by the female possessing the following: Tibiotarsus I terminates in a stout strongly recurved claw which is recessed basally and truncated distally; tarsi II and III have empodia and an outer single lateral claw each; tarsi II, III, and IV each has a ventral spur distally; the venter of the hysterosoma has three pairs of apodemal setae and three pairs of subequal genital setae.

I have studied a slide with four females and six males, which I believe to be *Tarsonemella beameri* Beer. Neither Hirst nor Beer described a male, and the opportunity is here taken to point out generic and specific differences based on this sex. The generic characters for the male are as follows: Tarsi II and III have strong ventral spurs; the pretarsal elements are normal and have two claws. The venter of the propodosoma has three pairs of setae and the hysterosoma has five pairs of setae. The opisthosoma has two pairs of lateral setae on a transverse line, the posterior pair having migrated inward. Apodeme II has two pairs of simple setae.

Type species. Tarsonemus (*Tarsonemella*) *africanus* Hirst.

Type data. Female, collected from—"A hymenopterous insect (*Agaon xystrum* Waterston); from Koforidua, Gold Coast (April 4, 1921)."

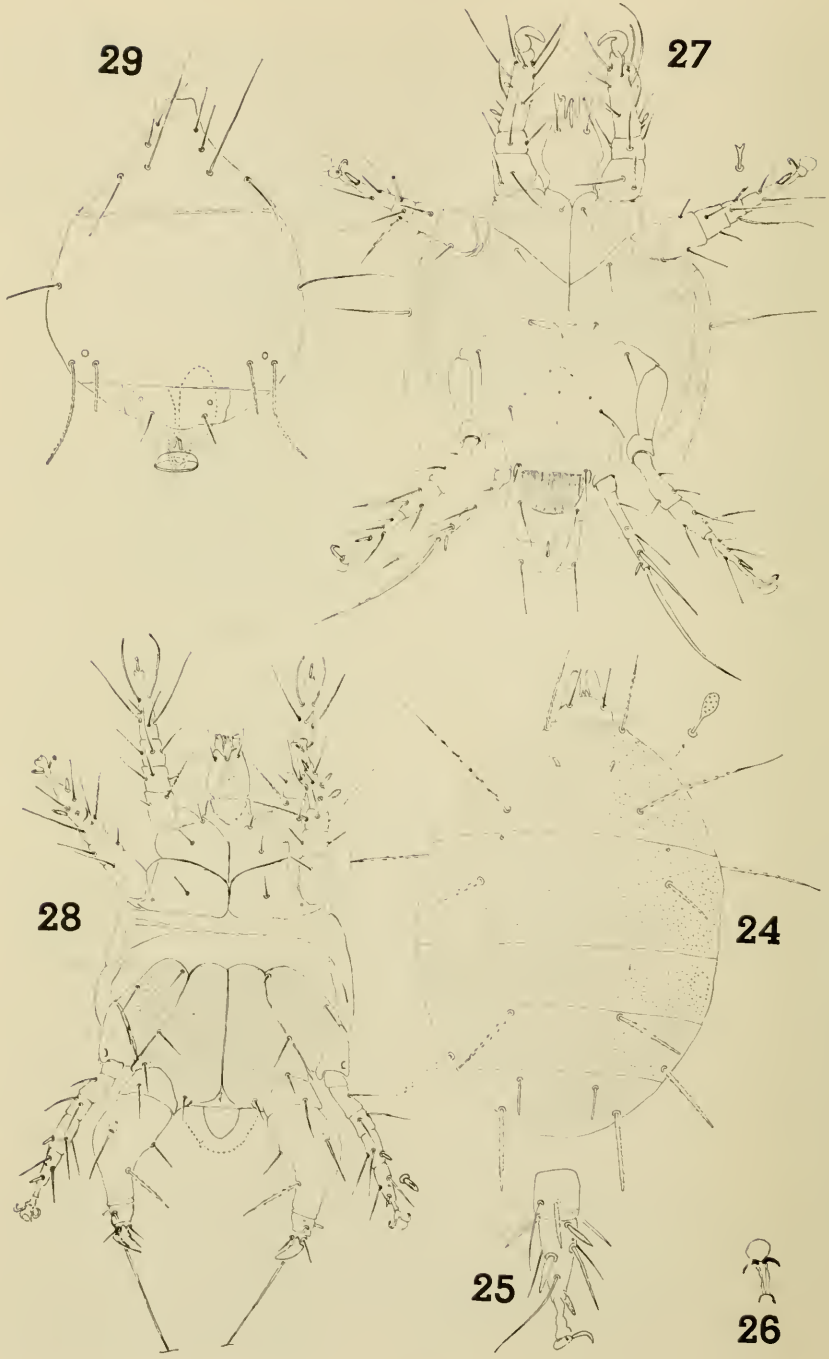
Tarsonemella beameri Beer
(Figs. 24–29)

Tarsonemella beameri Beer. 1958. Jour. Kan. Entomol. Soc. 31: (2) 188–192.

Female. The female is as illustrated and described by Beer except the following: The hysterosoma has six segments and is lightly sclerotized with two pairs of simple setae and six pairs of lobelike setae. The pseudostigmatic organs are macelike. The ventral hysterosomal has three pairs of subequal genital setae and two pairs of subequal apodemal setae and a smaller pair below the suture adjacent to the transverse apodeme. The empodium of tarsi II and III has only a single outer lateral claw. Figure 25 represents my drawing of the tarsal claw on legs II and III, and figure 26 represents Beer's drawing of the tarsal claw for the same leg.

Male. Body elongate and broadest in region of the metapodosoma. Dorsal propodosomal setae simple, long, and slender; third pair of propodosomals longest, one-half again longer than others; first and second pair subequal in length; third pair slightly longer than first and second pair. Hysterosoma with a pair of simple lateral setae; two pairs of finely serrated setae postero-laterally, the outer pair longest, the inner pair about one-half the length of the outer pair; a pore located above this pair of setae; below these setae a pair of simple setae about one-half the length of the inner pair of finely serrated setae. Venter of gnathosoma and hysterosoma as figured; propodosoma with three pairs of setae; first pair shortest and adjacent to apodeme I; second pair, slightly longer than first pair, medially located on coxae II; coxae II with small lateral pore. Apodeme I forming Y-shaped juncture with anterior median apodeme; apodeme II curved, well defined, and converging with anterior median apodeme; apodeme III with two pairs of simple setae medially, and one pair anterior to apodeme IV; apodeme IV with three simple setae, one adjacent to apodeme III, another above the trochanter, these two being subequal in length; a shorter and smaller seta located posteriorly on coxae IV ; posterior median apodeme well defined; coxae III and IV slightly sclerotized. Anal plate large and well defined, lying above the subcircular genital papilla. Legs I and II robust, as figured; legs III smallest, tarsi II and III with ventral spurs; legs IV as figured; femur with inner protuberance bearing a simple seta; below this seta a large finely serrated seta. Body 185 μ long by 121 μ wide.

Type data. Holotype and paratypes: Females, Saipan, Marianas Is-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lands, November 14, 1947, W. H. Lange, from the beetle, *Brontispa mariana*, on coconut palm, *Cocos nucifera* L.

Specimens examined. Three paratype females in the USNM Collection, and four females and six males collected by R. F. Winch in Chestnut, Cook Islands, April 10, 1964, which I believe to be the same species.

Neotarsonemus, n. gen.
(Figs. 30–31)

This genus is established to include two species previously assigned to *Hemitarsonemus* Ewing. These species are *H. latus* (Banks) and *H. beeri* Smiley. The two species may be separated as follows: In the males, the hysterosomal setae are long in *beeri* and short in *latus*. The females may be separated in that the transverse apodeme connects with the anterior median apodeme in *beeri*, whereas in *latus* these two apodemes do not connect.

The generic characters for the male are as follows: Tarsi II and III are without claws but with well defined bell-shaped empodia; tarsi I have claws. Leg IV is composed of five segments: the tarsus, tibia, femur, coxa, and the apodeme. The apodemal segment is defined by the fusion of the posterior median apodeme, apodeme IV, and what is here considered as the fifth apodeme, all connecting to the coxal segment. When these two segments merge with the posterior median apodeme, they form an archlike structure which is not present among males of the other genera. Femur IV has a spurlike process on the inner margin. Tarsus IV terminates with a knoblike claw. The propodosoma has four pairs of setae.

The characters for the females are as follows: Tarsus I has a recurved claw which is recessed basally and truncated distally. Tarsi II and III are without claws but have well defined bell-shaped empodia; there is a pair of setae between coxae IV.

Type species. Hemitarsonemus beeri Smiley, 1964.

Tarsonemus bucheleri, n. sp.
(Figs. 32–35)

This species may be recognized by the presence of an extremely large solenidion on tibia II and by a serrate seta on genu I and II ventrally.

Male. Body short, oval, broadest at metapodosoma. Dorsal body setae short, slender, as figured; third pair of propodosomals longest, one-third longer than first and fourth pairs; second pair shortest, about two-thirds length of third pair; fourth pair subequal in length to first pair. First three pairs of hysterosomals of equal length, about as long as first and fourth pairs of propodosomal setae. Opisthosoma with a single pair of simple setae, subequal to second pair of propodosomals. Ventral apodemes as figured, first pair shorter than second pair and not forming the Y-shaped juncture at the anterior median apodeme. Transverse apodeme slightly obscure and separating at the anterior median apodeme; setation as figured; first

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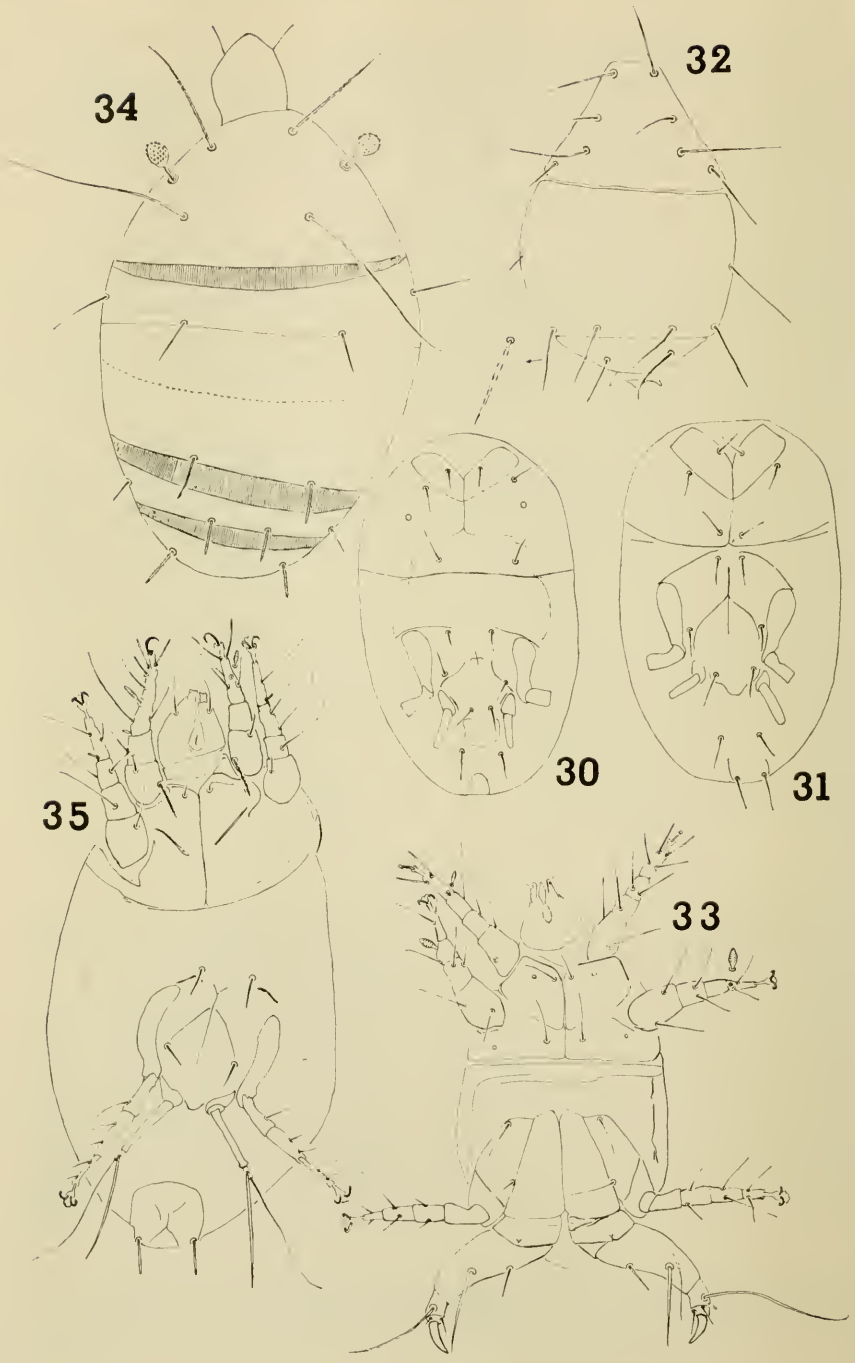
Tarsonemella beameri. Fig. 24, dorsum, female; fig. 25, tarsus and tibia II, female; fig. 26, distal segment of tarsus II (after Beer); fig. 27, venter, female; fig. 28, venter, male; fig. 29, dorsum, male.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ventral apodemal setae shorter than second pair; posterior median apodeme forming an M-shaped juncture with apodemes III and IV; setation adjacent to the two apodemes simple and subequal in length. Legs I and II subequal in length and size; legs III smaller than legs I and II; legs IV as figured; femur with short anterior inner seta and a longer, stronger distal, daggerlike seta; genu with whiplike seta and strong solenidion; tibia–tarsus short, with short, slightly curved claw. Body 159 μ long by 83 μ wide.

Female. Body broadly oval, broadest at midlength. Pseudostigmatic organs spherical, bearing small spurlike projections, pedicel as long as expanded distal portion. Propodosomal shield with two pairs of setae; anterior pair serrated, two-thirds length of second pair; second pair simple, long, and slender, one-tenth shorter than length of the entire propodosoma; with a pair of median simple setae, one-third length of first pair of propodosomals and subequal to lateral pair. Hysterosoma with four segments, first segment with a pair of dorsal simple setae, and a pair of lateral simple setae; second segment larger than first, with a pair of serrated setae; third segment with lateral simple setae, and with a pair of serrated setae subequal to those of second segment; fourth ventral segment with one pair serrated setae; apodeme I, short, converging with anterior median apodeme; apodeme II longer than I, and not converging with anterior median apodeme; a pair of small, simple setae adjacent and below apodeme I; apodeme II without setae, transverse apodeme U-shaped, apodemes III and IV with a pair of subequal simple setae; posterior median apodeme forming a Y-shape at nonconverging extremities of apodeme III; apodeme IV converging with posterior median apodeme. Ventral setation for legs and genital plate as figured. Body 217 μ long by 114 μ wide.

The male holotype, USNM 3169, and a female paratype were collected on *Ananas sativus* Schult., Cook Islands, December 20, 1963, by A. Bucheler, for whom the species is named.

Tarsonemus hunti, n. sp.
(Figs. 36–43)

This species may be recognized by the presence of the finely serrated hysterosomal setae and by a solenidion on tibia II which is almost as long as the segment.

Male. Body short, oval, broadest at metapodosoma. Propodosomal setae simple; first pair stronger and longer than others; second pair shortest; third pair slightly longer than second pair but not as long as fourth pair; fourth pair slightly shorter than first pair. Gnathosoma about as wide as long and as figured. Hysterosoma with three pairs of finely serrated setae, subequal in length; two pairs located transversely above suture; a single pair below suture; a pair of simple lateral setae present. Ventral propodosomal and hysterosomal setae subequal in length. Anterior median apodeme forming two distinct right angles with transverse apodeme;

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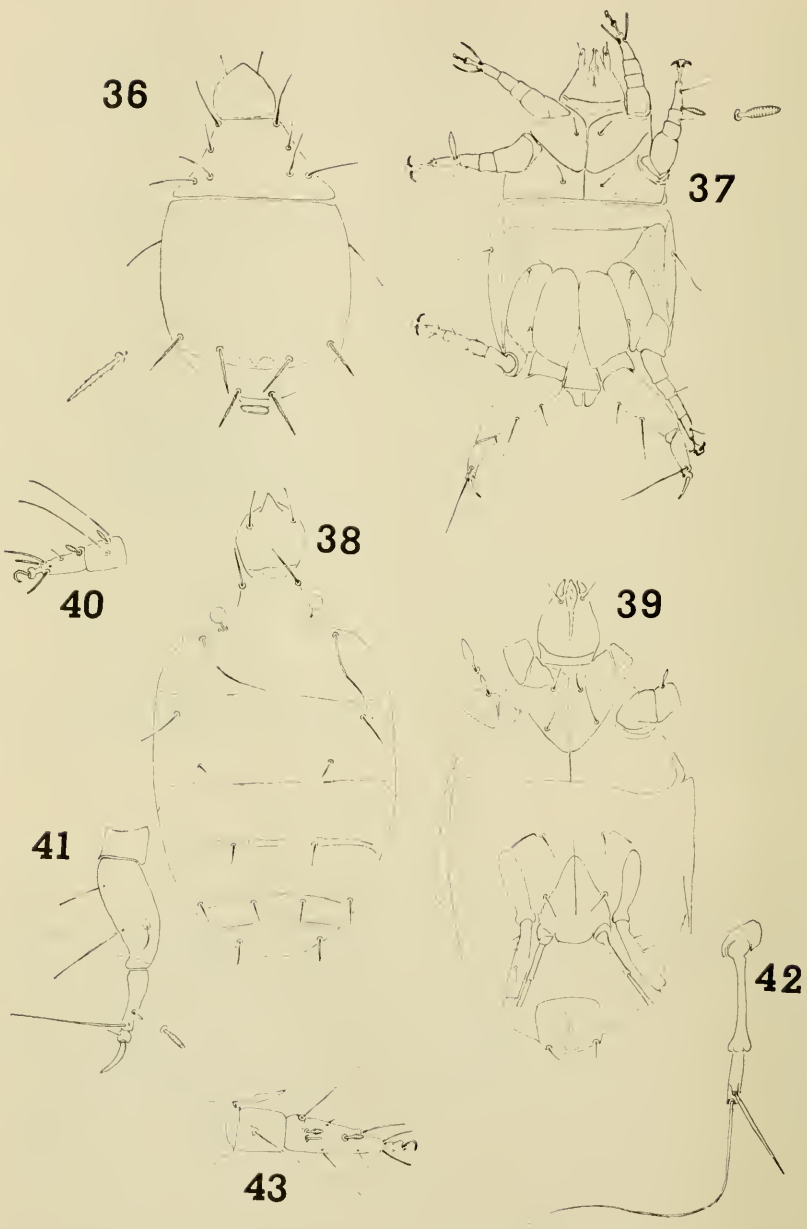
Neotarsonemus, new genus. Fig. 30, diagrammatic presentation of venter of female *N. latus*; fig. 31, diagrammatic presentation of venter of female *N. beeri*. *Tarsonemus bucheleri*, new species. Fig. 32, dorsum, male; fig. 33, venter, male; fig. 34, dorsum, female; fig. 35, venter, female.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sclerotization light above and below this apodeme. Venter of the hysterosoma as figured and with bowl-shaped plate above and adjacent to apodemes III and IV. Legs I and II similar in length. Leg II smaller in size and length to legs I and II. Leg IV as figured and terminating with a long slender curved claw. Body 127 μ long by 70 μ wide.

Female. Distinctive in having short, rodlike solenidion on tarsi I and II and a ball-shaped pseudostigmatic organ with spurlike projections. Body 165 μ long by 95 μ wide.

The male holotype, USNM 3170, and a female paratype were collected on *Hibiscus* sp., Tonga Islands, October 13, 1964, by P. C. Hunt, for whom the species is named.

Tarsonemus stricketti, n. sp.
(Figs. 44–45)

This species may be recognized by the presence of the finely serrated hysterosomal setae and the ventral striation pattern.

Male. Body broad, oval, broadest at sejugal suture. Dorsal propodosomal setae simple, long and slender; third pair of propodosomals longest, one-half as long as the other three pair; first pair longer than second and fourth pair; second pair shortest; fourth pair about two-thirds the length of first pair. Hysterosoma with three pairs of finely serrated setae; the first two pairs subequal in length, lying transversely near the posterior margin; a shorter pair caudad. Venter of propodosoma as figured; apodemes I short, forming a Y-shaped juncture with anterior median apodeme; apodemes II long and strong, curving inward to anterior median apodeme; transverse apodeme strong, curving inward to anterior median apodeme to form apodemal plate II; apodemal plate I with lateral pore below coxal condyle, and with a simple seta; apodemal plate II without pore, but with a simple seta; striations for each plate as figured. Venter of hysterosoma as figured; with a pair of lateral plates each with a simple seta; apodemal plates III and IV with longitudinal striations; each plate with a pair of simple setae; seta on plate III longer than that on IV. Legs I and II subequal in length and size and with strong solenidion on each tarsus as figured; leg III smallest; leg IV with short, stout femur bearing a simple seta proximally and long slender saberlike seta distally; tibia IV with a dorsal strong solenidion and terminating with a short, strong tarsal claw. Body 172 μ long by 96 μ wide.

The male holotype, USNM 3173, was collected from water chestnut, Hong Kong, January 13, 1965, by J. H. Strickett, for whom the species is named.

Tarsonemus moseri, n. sp.
(Figs. 46–50)

This species is characterized by the short stubby femur of leg IV and by the length of the fourth pair of propodosomal setae.

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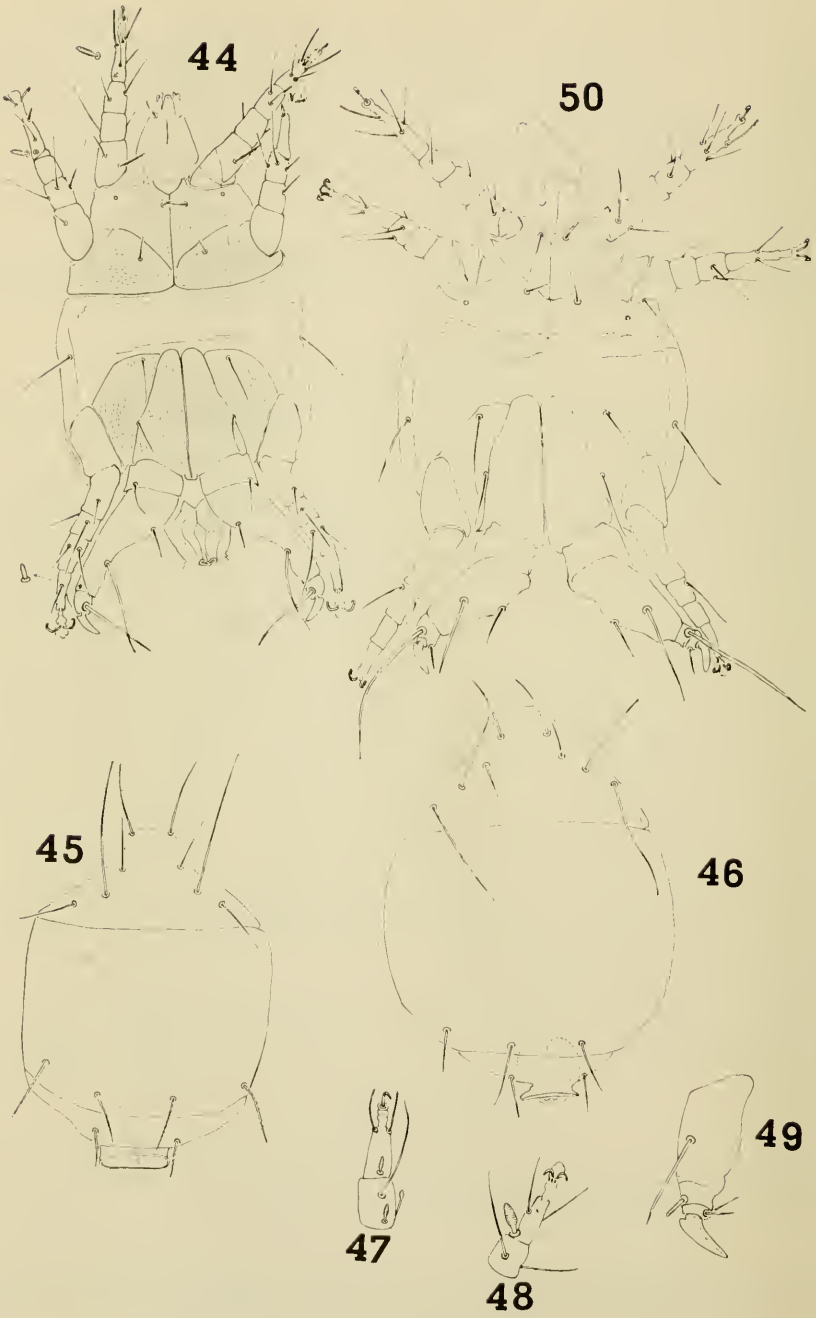
Tarsonemus hunti, new species. Fig. 36, dorsum, male; fig. 37, venter, male; fig. 38, dorsum, female; fig. 39, venter, female; fig. 40, tibia and tarsus I, male; fig. 41, leg IV, male; fig. 42, leg IV, female; fig. 43, leg I, female.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Male. Body oval, broadest in region of metapodosoma. Dorsal propodosomal setae simple, long and slender; fourth pair of propodosomals longest, one-half longer than second pair, and one-third longer than first and third pair; first and third pair subequal in length. Hysterosoma with three pairs of simple setae; first two pairs subequal in length, lying transversely near the posterior margin; a shorter pair caudad. Venter of propodosoma as figured; apodemes I short, forming a Y-shaped juncture with anterior median apodeme; apodeme II long and strong, curving inward to anterior median; anterior median not well defined below apodeme II, converging with transverse apodeme and forming distinct right angles and apodemal plate II; apodemal plate II large, with lateral pore medially to transverse apodeme and coxal condyle II. Venter of hysterosoma as figured; two lateral plates each with a simple seta; apodemal plate III with two simple setae, proximal seta one-third longer than distal seta; apodemal plate IV without setae. Legs I and II subequal in length and size; tarsus II with large solenidion twice the size of solenidion on tarsus I; leg III smallest; leg IV with short stubby femur, bearing a short simple seta proximally and long saberlike seta distally; tibia IV with a strong dorsal solenidion and a long whiplike seta, and terminating with short, strong tarsal claw. Body 134 μ long by 83 μ wide.

The male holotype, USNM 3172, and 7 male paratypes were collected from inner galleries of loblolly pine with *Dendroctonus frontalis* Zimmerman at Elizabeth, Louisiana, January 3, 1966, by John C. Moser, U. S. Forest Service, Southern Forest Experiment Station, U. S. Department of Agriculture, Pineville, Louisiana, for whom the species is named.

Tarsonemus stegmaieri, n. sp.
(Figs. 51–55)

This species may be recognized by the presence of the saberlike seta on femur IV and the ventral spur on tibia IV.

Male. Body oval, broadest in region of metapodosoma. Dorsal propodosomal setae simple, long, and slender; third pair of propodosomals longest, almost one-half longer than second and fourth pairs; first pair one-third shorter than third pair; second and fourth pairs subequal in length. Hysterosoma with three pairs of simple setae; first two pairs subequal in length and lying transversely near the posterior margin; a shorter pair caudad. Venter of propodosoma as figured; apodemes I short, forming a Y-shaped juncture with anterior median apodeme; apodeme II long and strong, curving inward to anterior median apodeme; anterior median apodeme stronger below apodemes II and converging with transverse apodeme to form apodemal plate II; apodemal plate II wider than long, whereas apodemal plate I is longer than wide; each plate with a simple seta; the setae on plate I shorter; plate I with lateral pore. Venter of hysterosoma as figured; apex of apodemes III and IV forming M-shaped juncture with posterior median apo-

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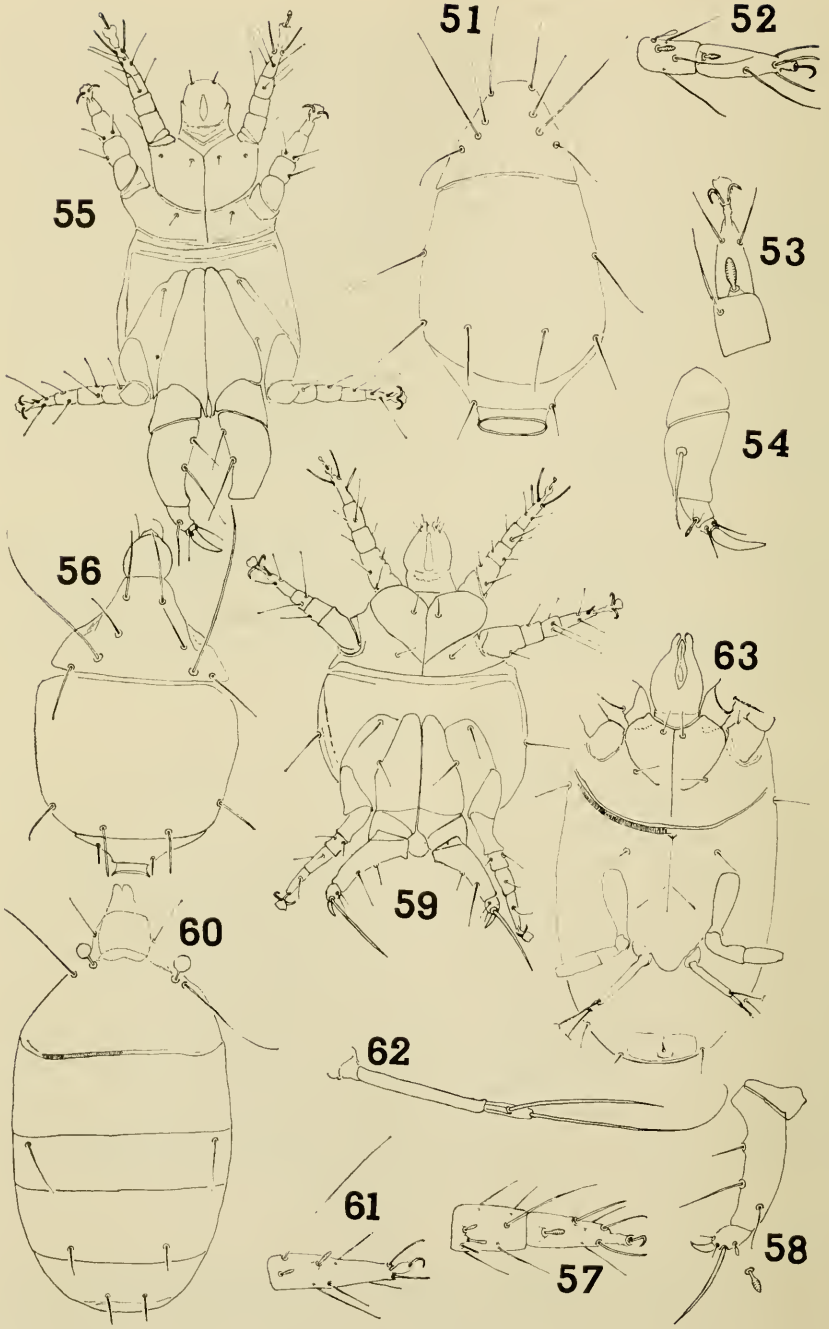
Tarsonemus stricketti, new species. Fig. 44, venter, male; fig. 45, dorsum, male. *Tarsonemus moseri*, new species. Fig. 46, dorsum, male; fig. 47, tarsus and tibia I, male; fig. 48, tarsus and tibia II, male; fig. 49, leg IV, male; fig. 50, venter, male.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deme; apodemal plate III with two simple setae, proximal seta one-half longer than distal seta; apodemal plate IV without setae. Legs I and II subequal in length; legs III smallest; tarsus III with a ventral spur; leg IV with short femur, bearing a short, simple seta and long daggerlike seta distally; tibia IV with strong dorsal solenidion and a short simple seta, and terminating with long, strong tarsal claw. Body 140 μ long by 70 μ wide.

Female. Not known.

The male holotype, USNM 3171, was collected from coconut in husk, Bahama Islands, August 31, 1964, by C. E. Stegmaier, for whom the species is named.

Tarsonemus newkirki, n. sp.

(Figs. 56–63)

This species may be recognized by the third pair of propodosomal setae which are longer than legs I and II and by the heart-shaped figure formed by apodemes I and II, coxal condyles I, and the anterior median apodeme.

Male. Body oval, broadest at suture separating propodosoma and hysterosoma. Dorsal propodosomal setae simple, long, and slender; third pair of propodosomals longest, one-half longer than first pair; first pair strong, one-third longer than second pair; second pair shortest; fourth pair subequal to first, but not as strong. Hysterosoma with three pairs of simple setae; first two pairs subequal in length and lying transversely near posterior margin; a shorter pair caudad. Venter of propodosoma as figured; apodemes I short, curving to coxal condyles, and forming Y-shaped juncture with anterior median apodeme; apodemes II strong, converging with anterior median apodeme; when viewed as a whole, these structures give a heart-shaped figure; anterior median apodeme not well defined below center of apodemes II, converging with transverse apodeme; apodemal plates I and II with a pair of setae subequal in length. Venter of hysterosoma as figured; posterior median apodeme forming M-shaped juncture with apodemes III; apodemal plate III with two pairs of subequal simple setae; apodemal plate IV without setae. Legs I and II subequal in length and size; leg III smaller, but subequal in length to legs I and II; leg IV as figured; with long femur bearing an inner simple seta proximally, a daggerlike seta medially and a simple seta dorso-distally; tibia IV with a strong solenidion and a saberlike seta; tarsus IV terminating with a short, strong tarsal claw. Body 127 μ long by 76 μ wide.

Female. Distinctive in having a heart-shaped figure formed by apodemes I and II, coxal condyles I, and the anterior median apodeme. Body 127 μ long by 76 μ wide.

The male holotype, USNM 3174, and a female paratype were collected on semidecayed banana, Fiji Islands, September 22, 1963, New

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Tarsonemus stegmaieri, new species. Fig. 51, dorsum, male; fig. 52, tibia and tarsus I, male; fig. 53, tibia and tarsus II, male; fig. 54, leg IV, male; fig. 55, venter, male. *Tarsonemus newkirki*, new species. Fig. 56, dorsum, male; fig. 57, tarsus and tibia I, male; fig. 58, leg IV, male; fig. 59, venter, male; fig. 60, dorsum, female; fig. 61, tarsus I, female; fig. 62, leg IV, female; fig. 63, venter, female.

Zealand Department of Agriculture, Plant Quarantine No. A320. The species is named for Richard A. Newkirk, Survey and Detection, ARS, Plant Pest Control Division, U. S. Department of Agriculture.

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NEW HOST RECORDS FOR NORTH AMERICAN FRUIT FLIES (DIPTERA: TEPHRITIDAE)

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Although host plants have been reported for about 70% of the approximately 240 species of Tephritidae known to occur in America north of Mexico, many of the published records are not based on actual rearings or are too fragmentary to be of much value. A few workers assumed that the larvae of a particular tephritid fed on a plant merely because adults were seen on the foliage. Another source of confusion has resulted from the changing taxonomic status of certain tephritid groups. For example, some previously well-known species have been shown subsequently to be really species groups (see Bush, 1966, on *Rhagoletis*). It is frequently difficult, if not impossible, to determine at a later date which species of the complex was actually reared from a particular host.

This paper is based on rearings conducted in southern Idaho and northwestern Montana during the summers of 1965 and 1966 and in northeastern Ohio between 1961 and 1966. It is presented now so that the records can be included in a comprehensive list of host plants of

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Nearctic Tephritidae being compiled by Miss Karen Cassens and Richard H. Foote, Entomology Research Division, ARS, USDA. The fruit flies were identified by R. H. Foote. The host plants were determined by W. H. Baker of the University of Idaho, by J. Thomas of Stanford University, and by A. Cusick and T. S. Cooperrider of Kent State University.

The Tephritidae listed below follow the arrangement given in the recently published Diptera Catalog (Stone, *et al.*, 1965). For each included species are given the host plants, part of host attacked, location of rearing, and any other pertinent observations.

Host Records

Procecidochares minuta (Snow). *Chrysothamnus viscidiflorus* (Hook.) Nutt.; buds. Idaho. Larvae form small, monothalamous bud galls at apices of small twigs.

Eutreta frontalis Curran. *Aster simplex* Willd.; young shoots. Ohio.

Eutreta sparsa (Wiedemann). *Solidago altissima* L.; rhizomes. *S. rugosa* Mill., *Aster laevis* L., *Helianthus annuus* L., *H. giganteus* L., *Vernonia altissima* Nutt.; stems. Ohio. Stem-dwelling larvae usually form small galls. Adults reared from different host plants differ in size, color, and wing pattern and may represent host races. Males bred from *S. altissima* used froth masses as part of their courtship display (Stoltzfus and Foote, 1965).

Eurosta elsa Daecke. *Solidago juncea* Ait.; rhizomes. Ohio. Larvae form large, rather soft galls on rhizomes just below the crown.

Eurosta reticulata Snow. *Solidago juncea*; young shoots. Ohio. Larvae form large, terminal bud galls in crown.

Jamesomyia geminata (Loew). *Lactuca canadensis* L.; flower heads. Ohio.

Xenochaeta dichromata Snow. *Hieracium cynoglossoides* Arv-Touv.; flower heads. Montana.

Icterica circinata (Loew). *Bidens cernua* L.; flower heads. Ohio. Foote (In Press) presented the life cycles and described the immature stages of the 2 Nearctic species of *Icterica*.

Icterica seriata (Loew). *Bidens aristosa* (Michx.) Britt., *B. coronata* (L.) Britt., *B. frondosa* L., *B. tripartita* L.; flower heads. Ohio.

Oxyna palpalis (Coquillet). *Artemisia tridentata* Nutt.; small branches. Idaho. Larvae form small, succulent, polythalamous galls. Although as many as 17 variously sized larvae were found in one gall, usually only 5 to 7 mature larvae were present.

Euaresta bella (Loew). *Ambrosia artemisiifolia* L.; flower heads. Ohio. Each larva completes development and pupates within one achene. Foote (1965) discussed briefly the life histories of this and the following species.

Euaresta festiva (Loew). *Ambrosia trifida* L.; flower heads. Ohio. Each larva completes development within one achene.

Paroxyna albiceps (Loew). *Aster laevis, A. novae-angliae* L.; *A. pilosus* Willd., *A. praealtus* Poir., *A. puniceus* L.; flower heads. Ohio. Novak and Foote (In Press) discussed the natural history and described the immature stages of this species.

Dioxyna picciola (Bigot). *Bidens aristosa, B. cernua, B. tripartita*; flower heads. Ohio.

Trupanea bisetosa (Coquillet). *Arnica latifolia* Bong.; flower heads. Montana.

Trupanea jonesi Curran. *Arnica diversifolia* Greene, *Aster foliaceus* var. *parryi* (D. C. Eaton) Gray; flower heads. Idaho, Montana.

Trupanea radifera (Coquillet). *Balsamorhiza sagittata* (Pursh) Nutt., *Chrysopsis villosa* (Pursh) Nutt., *Senecio hydrophiloides* Rydb.; flower heads. Montana.

Tephritis stigmatica (Coquillet). *Aster canescens* Pursh, *Senecio crassulas* Gray, *S. triangularis* Hook.; flower heads. Idaho, Montana.

Neotephritis finalis (Loew). *Balsamorhiza sagittata, Gaillardia aristata* Pursh, *Helianthus annuus*; flower heads. Montana.

Aciurina maculata (Cole). *Chrysothamnus nauseosus* (Pall.) Britt.; stems. Idaho. Larvae form small galls along stem.

Aciurina semilucida (Bates). *Chrysothamnus nauseosus*; buds. Idaho. Larvae form small bud galls along branches.

Valentibulla californica (Coquillet). *Chrysothamnus nauseosus*; flower heads. Idaho.

Valentibulla munda (Coquillet). *Chrysothamnus nauseosus*; stems. Idaho. Larvae form large, polythalamous galls.

Xanthaciura tetraspina (Phillips). *Eupatorium maculatum* L.; flower heads. Ohio.

Stenopa vulnerata (Loew). *Senecio aureus* L.; young shoots. Ohio. Larvae form small galls near apices of lateral shoots arising from crown.

Strauzia longipennis var. *intermedia* (Loew). *Helianthus giganteus*; stems. Ohio.

Strauzia l. var. *longitudinalis* (Loew). *Helianthus decapetalus* L.; stems. Ohio.

Strauzia l. var. *perfecta* (Loew). *Ambrosia trifida*; stems. Ohio.

Strauzia l. var. *typica* (Loew). *Helianthus annuus*; stems. Ohio.

Strauzia l. var. *vittigera* (Loew). *Helianthus tuberosus* L.; stems. Ohio.

Tomoplagia obliqua (Say). *Vernonia altissima*; flower heads. Ohio.

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A REVIEW OF THE GENUS AULONIUM FOR THE UNITED STATES
(COLEOPTERA: COLYDIIDAE)

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Species in the genus *Aulonium* are small, flat, shining beetles characterized in most species by sexually dimorphic sculpturing on the pronotal disk. Because they are cryptic, they are seldom collected and are probably more common than museum collections and faunal lists indicate. Specimens are occasionally reared or collected by forest entomologists in connection with biological studies of Scolytidae, but they are considered of importance only for their association with and possible predation on economic forest insects.

As is true for most Colydiidae, little is known of the habits of the species of *Aulonium*. Kleine (1909) included *Aulonium trisulcum* (Geoffroy) in his list of predators of the bark beetle, *Scolytus multistriatus* (Marsham) in Europe. Craighead (1920) reported that very young larvae of *Aulonium tuberculatum* LeConte feed on macerated woody tissue. DeLeon (1934) listed *Aulonium longum* LeConte as "probably a facultative predator" associated with the mountain pine beetle, *Dendroctonus ponderosae* Hopkins, in ponderosa pine (*Pinus ponderosa* Lawson) and lodgepole pine (*Pinus contorta* Douglas). Until more is known about the habits of *Aulonium* spp., caution should be exercised in interpretation of tree host records. Relationships may lie with insect hosts rather than plant hosts.

The genus *Aulonium* was erected in 1845 by Erichson for four species: *Colydium bidentatum* Fabricius, 1801; *Colydium parallelopipedum* Say, 1827 (both from the Western Hemisphere); *Ips sulcata* Oliver, 1790 (now a synonym of *Aulonium trisulcus* (Geoffroy) 1785); and *Colydium bicolor* Herbst, 1797 (now a synonym of *Aulonium ruficorne* (Oliver), 1790). Both of the latter species are European. No type-species was designated by Erichson, and no subsequent designation of a type-species has been discovered.

Two generic names are listed as synonyms of *Aulonium* by Hetschko (1930). Redtenbacher, in 1845, proposed the first, *Anoectochilus*, for *Colydium bicolor* Herbst, but gave no description though he listed the genus in both a key to genera of Colydiidae and a catalog of species. In 1849, Redtenbacher himself synonymized *Anoectochilus* with *Aulonium*. Pascoe, in 1860, proposed the second, *Gloeania*, for his new species *ulomoides* from Brazil. Gemminger and Harold (1868), all subsequent papers and catalogs by various authors, and most recently, Hinton (1936), have placed the species *ulomoides* in *Aulonium*.

Horn (1878), in a revision of the Colydiidae for the United States,

provided a key to the four species treated in the present paper but did not include illustrations. No new species have been described from the United States since that time, and no species have been transferred to the genus *Aulonium*. Hetschko (1930) erroneously placed *Colydium lineola* Say in *Aulonium*.

Various faunal papers have included treatments of one or more species of *Aulonium* for the respective regions in the United States.

The genus is known from North and South America, Europe, and Asia.

Genus **Aulonium** Erichson

Aulonium Erichson, 1845, p. 275. Type-species, *Colydium bidentatum* Fabricius (present designation).

Anoectochilus Redtenbacher, 1845, p. 124. Type-species, *Colydium bicolor* Herbst (monobasic).

Gloeania Pascoe, 1860, p. 99. Type-species, *Gloeania ulomoides* Pascoe (monobasic).

Form depressed, elongate, subparallel. Polished brownish red to black. Prothorax and elytra subequal in width. Head depressed dorsally; epistoma slightly penetrating anterior margin of each eye; antenna 11-segmented with 3-segmented club, basal insertion beneath epistoma adjacent to eye. Procoxae globular with cavities closed behind; outer apical angle of protibia finely denticulate. Pronotal disk usually sexually dimorphic. Elytra elongate; striae finely, serially punctate; intervals finely alutaceous to reticulose, lateral margins subparallel, apices conjointly rounded.

Key to Species of **Aulonium** of the United States

1. Pronotal disk with paired distinct umbones at anterior one-third separated by shallow channel (figs. 2, 4, 7) 2
   Pronotal disk without umbones; median channel may be present 4
2. Anterior margin of pronotum with two rounded knobs (fig. 2) ..... ♂ **tuberculatum**
   Anterior margin of pronotum without knobs 3
3. Anterior margin of pronotum with distinct emargination at middle (fig. 7); prosternum very finely punctate ..... ♂ **longum**
   Anterior margin nearly straight (fig. 4); prosternum strongly punctate ..... ♂ **parallelopipedum**
4. Apex of each sublateral carina of the pronotum extending beyond anterior corner of pronotum; median lines deeply impressed (fig. 1) ..... ♂, ♀ **ferrugineum**
   Apex of each sublateral carina not extending beyond pronotal corners; median lines lightly impressed or nearly obliterated 5
5. Median lines of pronotal disk distinct, approaching at middle but diverging at base and apex (fig. 5); prosternum strongly, evenly punctate ..... ♀ **parallelopipedum**
   Lines of pronotum nearly obliterated on apical half of pronotum, subparallel in basal half; prosternum finely punctulate, with a tendency to be transversely strigulose 6

6. Anterior half of pronotal disk between sublateral carinae divided by broad, shallow channel into paired convexities corresponding to prominent umbones in ♂ (fig. 6); elytra unicolorous ..... ♀ **longum**
Anterior half of disk not strongly channeled, usually flat (fig. 3); apical half of elytra usually much darker than basal half ..... ♀ **tuberculatum**

Aulonium tuberculatum LeConte
(Figs. 2 and 3)

Aulonium tuberculatum LeConte, 1863, p. 67; Horn, 1878, p. 574–575; Blatchley, 1910, p. 554.

Male.—Body 3.6 times as long as wide. Reddish brown with apical half of elytra usually suffused with or distinctly piceous, suffusion usually extended along suture to scutellum. Epistoma slightly emarginate apically; vertex with prominent paired tubercles. Pronotum (fig. 2) slightly longer than wide (4:3.5), margins slightly arcuate, baso-lateral angles rounded; fine submarginal sulcus extending from antero-lateral angle to basal angle merging with transverse basal sulcus; anterior margin sinuate, broadly emarginate medially between prominent vertical knobbed processes; sublateral carinae prominent at anterior margin becoming obsolete at middle of pronotal disk, replaced by paired sublateral sulci on basal half; paired umbones at apical one-fourth; surface punctulate, slightly coarser punctures in paired submedian basal lines. Elytra with striae faintly indicated, intervals punctulate. Prosternum convex, faintly punctulate to impunctate. Length 4.5 mm.

Female.—Color as for male. Pronotal disk (fig. 3) smoother, lacking anterior tubercles and umbones; carinae less pronounced; anterior margin with a narrow, transverse, slightly raised bead between anterior extremities of sublateral carinae. Length 4.0–4.2 mm.

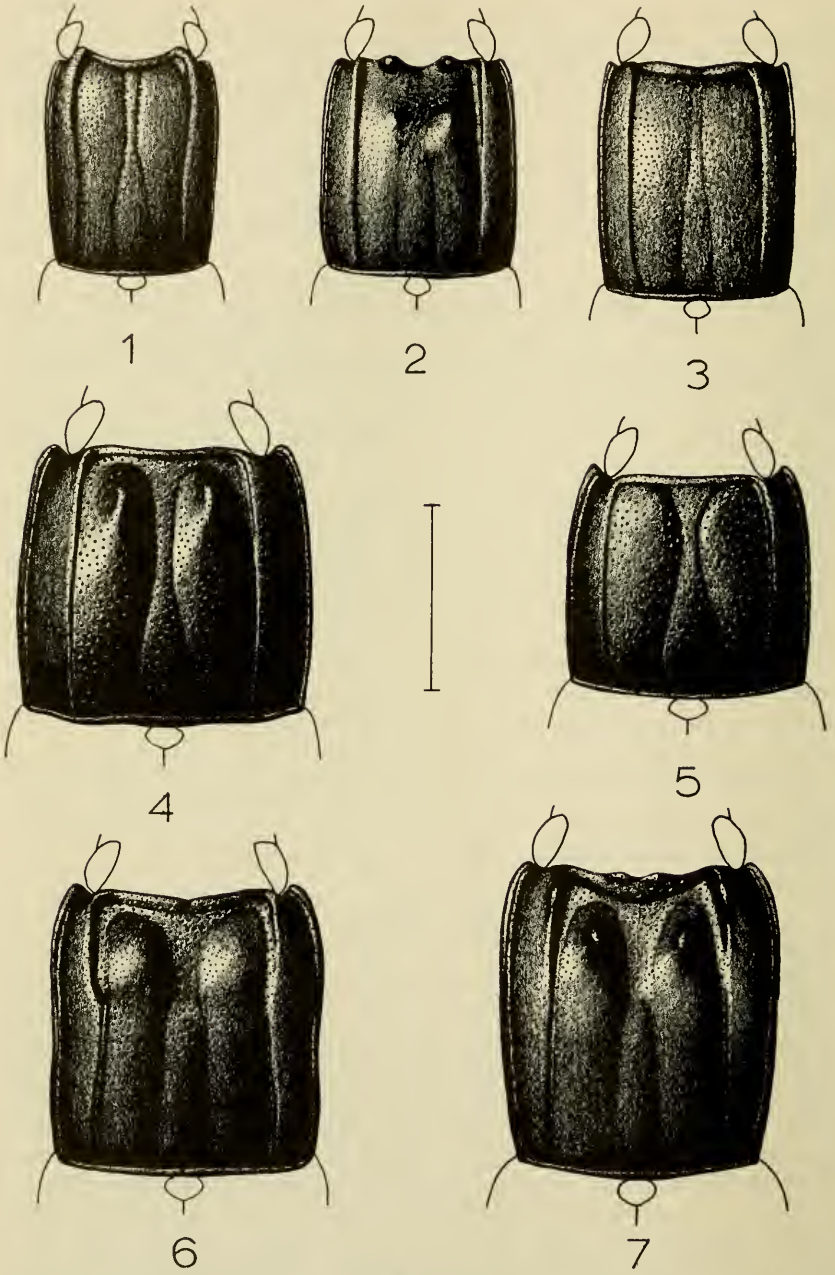
Geographical Range.—Alabama, District of Columbia, Florida, Georgia, Maryland, New Jersey, New York, North Carolina, Pennsylvania, South Carolina, Texas, Virginia, West Virginia.

Plant Hosts.—*Pinus virginiana* (Miller), *Pinus rigida* Miller.

Aulonium longum LeConte
(Figs. 6 and 7)

Aulonium longum LeConte, 1866, p. 378; Horn, 1878, p. 574; Hatch, 1961, p. 246.

Male.—Body about 3 times as long as wide. Reddish brown with piceous suffusion on margins of elytra. Head slightly convex above; vertex with two tubercles; epistoma evenly rounded except for very shallow apical emargination. Pronotum longer than wide (4.0:3.5), subparallel, lateral margins slightly convergent apically; anterior margin shallowly, bisinuately emarginate between apices of sublateral carinae, deeply emarginate between sublateral carinae and antero-lateral corners; pronotal disk as in fig. 7, surface sparsely punctulate; anterior umbones rounded, sublateral carinae sharp and prominent anteriorly, obsolete on basal two-thirds. Elytra subparallel in basal three-fourths, conjointly rounded apically; intervals flat, discal striae depressed basally, faintly indicated medially, merging with punctures of intervals apically. Prosternum strongly convex, shallowly, sparsely punctate. Length 5.5 mm.



Pronota of *Aulonium*. Fig. 1, *ferrugineum* Zimm., ♂ and ♀; fig. 2, *tuberculatum* Lec., ♂; fig. 3, *tuberculatum* Lec., ♀; fig. 4, *parallelopipedum* (Say), ♂; fig. 5, *parallelopipedum* (Say), ♀; fig. 6, *longum* Lec., ♀; fig. 7, *longum* Lec., ♂.

Female.—Slightly smaller than male (4.5–4.75 mm). Pronotal disk convex but not tuberculate (fig. 6).

Geographical Range.—Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, South Dakota, Utah, Washington.

Plant Hosts.—*Pinus edulis* Engelmann, *Pinus jeffreyi* A. Murray, *Pinus ponderosa* Lawson, *Pinus strobiformis* Engelmann.

Aulonium parallelopipedum (Say)
(Figs. 4 and 5)

Colydium parallelopipedum Say, 1826, p. 263. (From LeConte, 1859)
Aulonium parallelopipedum, LeConte, 1859, p. 324; Horn, 1878, p. 574; Blatchley, 1910, p. 554.
Aulonium aequicolle LeConte, 1859a, p. 84. Synonymized by Crotch, 1873, p. 46.

Male.—Body 3 times as long as wide. Reddish piceous. Head nearly flat on vertex, slightly convex on dorsum of epistoma; vertex with two indistinct convexities between eyes; epistoma shallowly emarginate apically; head densely punctulate, punctures deeper on vertex than on epistoma. Pronotum as long as wide, quadrate, margins subparallel, slightly convergent anteriorly and posteriorly, posterolateral corners angulate, anterior margin perceptibly emarginate between sublateral carinae, beaded, deeply emarginate between sublateral carinae and anterior corners; pronotal disk (fig. 4) with paired umbones low, rounded; paired median sulci extending from base to apex of pronotal disk; surface, finely, evenly punctate. Elytra subparallel on basal three-fourths, conjointly rounded apically; intervals flat, striae composed of fine, close-set punctures distinct from base to apex. Prosternum slightly convex; punctation moderately dense. Length 5.5 mm.

Female.—Slightly smaller than male (4.75 mm). Pronotal disk (fig. 5) not umbonate.

Geographical Range.—Arkansas, District of Columbia, Florida, Georgia, Illinois, Kentucky, Louisiana, Maryland, Mississippi, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia.

Plant Hosts.—*Castanea dentata* (Marshall) Borkhausen, *Carya* spp., *Liriodendron tulipifera* Linnaeus, *Quercus* spp., *Taxodium distichum* (L.) Richard.

Aulonium ferrugineum Zimmermann
(Fig. 1)

Aulonium ferrugineum Zimmermann, 1869, p. 254; Horn, 1878, p. 574, 575.

Male.—Body 3.6 times as long as wide. Uniformly reddish brown. Head flat with small, paired umbones on vertex; epistoma slightly emarginate. Pronotum longer than wide (7:5), margins slightly convergent toward base; posterior corners rounded; submarginal sulcus fine, continuous with basal sulcus, the latter slightly arcuate medially; anterior margin deeply, evenly emarginate between apices of sublateral carinae, the latter extending beyond anterior corners; marginal bead of median emargination flat; sublateral carinae extending basad about half length of pronotal disk, continuing as a sublateral sulcus to base; median paired sulci convergent apically; surface punctulate, median sulci with elongate, irregular punctures. Elytra with striae indistinct; surface with irregular punctulation. Proster-

num convex, punctulate, with punctures tending to be transversely strigose. Length 3.75–4.0 mm.

Female.—Color as for male. Pronotal disk same as that of male. Length 3.75–4.0 mm.

Geographical Range.—Alabama, Texas, Florida, North Carolina, South Carolina.

Plant Hosts.—*Pinus echinata* Miller, *Pinus palustris* Miller, *Pinus rigida* Miller, *Pinus taeda* Linnaeus.

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TINCONARIA ALBESCENTIS, A NEW NORTH AMERICAN GENUS AND SPECIES OF CECIDOMYIIDAE FOUND IN SEEDS OF TRIODIA ALBESCENS VASEY

(Diptera)

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The genus described below belongs to the tribe Contariniini of the dipterous family Cecidomyiidae. It is close to *Contarinia* and *Stenodiplosis* on the basis of male and female genitalic characters, but it differs from them and all the other genera of the tribe by the following combination of characters: The 2-segmented palpus, the greatly enlarged tarsal claw in relation to the last tarsomere, and the equal length of the tibiae and tarsi. The wing is slightly narrower than other grass-infesting midges belonging to *Contarinia* and *Stenodiplosis.*

Tinconaria, n. gen.

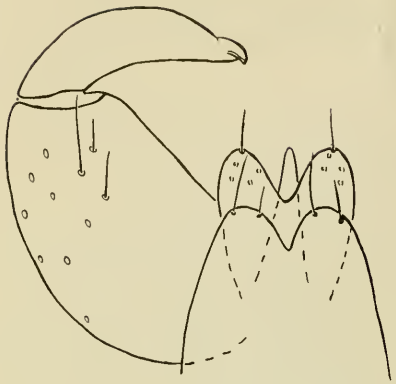
Antenna with 12 flagellomeres, the two nodes of each flagellomere subequal, each girdled by one circumfilum and a whorl of setae. Palpus 2-segmented, the segments short, seldom longer than twice the diameter. Wing narrow; Cu_1 and Cu_2 evanescent on the distal half; area behind cubitus narrowed. Tarsi short, approximately equal to the tibiae in length; tarsal claws (fig. 2) simple, approximately two-thirds the length of the last tarsomere. Male postabdomen (fig. 1) with the tenth tergum and sternum both bilobed, the lobes rounded; aedeagus not greatly produced, tapering distally; basimere stout; distimere tapering gradually beyond the middle, toothed at apex. Female ovipositor (8th abdominal segment to apex, inclusive) approximately twice as long as remainder of abdomen, longitudinally striated on distal half except for the sclerotized cerci (figs. 3, 4) which are elongate-attenuate and bear several setae.

Type-species: *Tinconaria albescentis* n. sp.

This genus is established for the species described below, which was reared from seed heads of *Triodia albescens* Vasey (Gramineae). Information about the antennae is from a specimen not included in the following description but discussed below.

Tinconaria albescentis, n. sp.

Antennae missing. Palpus: 2-segmented; first segment short and blunt, 0.020–0.030 mm. in length, 0.015–0.025 mm. in dia.; second segment short, tapering at apex, 0.028–0.033 mm. in length, 0.010–0.015 mm. in dia. Chaetotaxy: frontoclypeal setae, 9–15 (avg. of 8 observations, 12); dorsocentral, 9–14 (12); scutal, 11–16 (13); scutellar, 2–4 (3); subalar, 3–4 (3). Length of foretarsomeres (in mm.): I, 0.065–0.075 (avg. of 6 observations, 0.068); II, 0.200–0.225 (0.210); III, 0.190–0.200 (0.195); IV, 0.060–0.075 (0.065); V, 0.060–0.070 (0.065). Per cent length of each tarsomere to total length of tarsus, from I to V; 13, 42, 19, 13, 13. Tarsi subequal in length to tibiae. Tarsal claw (fig. 2)



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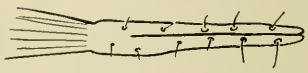

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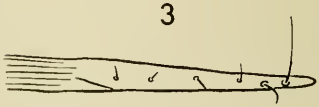

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Fig. 1. Male postabdomen, 400×. Fig. 2. Tarsomere V of foreleg, 300×. Fig. 3. Cerci of ovipositor, dorsal view, 450×. Fig. 4. Same, lateral view, 450×.

very long, simple, more than two-thirds the length of tarsomere V, 0.045–0.050 mm. in length. Empodium shorter than claws. Wing length 1.36–1.49 mm. (avg. of 8 observations, 1.43 mm.), width 0.47–0.53 mm. (0.50 mm.); ratio width to length (based on avgs.) 0.345. Cu_1 and Cu_2 evanescent on distal half; posterior area narrowed. Male postabdomen (fig. 1): tenth tergum and sternum bilobed, the sternum longer; aedeagus acute, as long as tenth sternum; basimere short, stout; distimere tapering gradually beyond middle, toothed at apex. Female postabdomen: cerci (figs. 3.4) long, thin, closely juxtaposed laterally, tapering at end, 0.065–0.075 mm. in length and with several setae scattered along the surface.

Immatures stages unknown.

Material examined. Holotype (on slide): ♀; ex seeds of *Triodia albescens*; intercepted by U.S. Department of Agriculture, Plant Quarantine Division; Brownsville, Texas; V-16-1966; 66-14344; U.S. National Museum type no. 69358. Paratypes: 1♂, 6♀♀, with same data as holotype. Types all deposited in U.S. National Museum.

Midges similar to *T. albescentis* have been previously reported in the literature but have been misidentified as *Contarinia sorghicola* (Coquillett), the sorghum midge. G. G. Ainslee (unpub.) reared several specimens from the heads of *Triodia flava* (L.) Smyth and identified them as *C. sorghicola*. Dean (1911), Walter (1941), and Barnes (1956) referred to those specimens under that name. In the U.S. National Museum there is one specimen of the midges reared by Ainslee. The label bears the following data: "*Diplosis sorghicola*; Web. No. 1874; Clemson Col., S.C.; 2 Oct. '08; bred from heads of

Triodia sesleroides; Geo. G. Ainslee." *T. sesleroides* is a synonym of *T. flava*. Though it is obvious the specimen belongs to *Tinconaria* because of the 2-segmented palpus and the large tarsal claw, it is in very poor condition on a slide. Therefore I cannot be sure whether this specimen belongs to the species described above or is a different species. This Ainslee record does show, however, that *Tinconaria* is found on another species of *Triodia*.

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THE METANOTAL GLAND AS A TAXONOMIC CHARACTER IN OECANTHUS OF THE UNITED STATES[1]

(Orthoptera: Gryllidae)

T. J. Walker[2] and Ashley B. Gurney[3]

Male crickets of the subfamily Oecanthinae have a large glandular cavity in the metanotum. This metanotal gland is sometimes called Hancock's gland because Hancock (1905) was the first to describe it adequately. The metanotal gland is mouthed (i.e., "licked" or bitten) by the female before and after she receives the spermatophore from the male. Its secretions probably are important both to the successful transfer of the spermatophore and to the diversion of the female while the sperm pass from the spermatophore into the sperm receptacle. During this time, the male has the tegmina raised, exposing the gland, and the female is astride the male. The female removes and eats the spermatophore soon after leaving the male. A third function of the gland may be to keep the pair together until another spermatophore can be passed. Postcopulatory feeding at the gland may last for over an hour (65 minutes observed in *Oecanthus pini* by TJW), and a second spermatophore may be transferred within 70 minutes of the first (observed in *O. argentinus* by TJW). A fourth function may be that the secretions are specifically distinct and account

[1] Study supported by NSF Grant GB4949.

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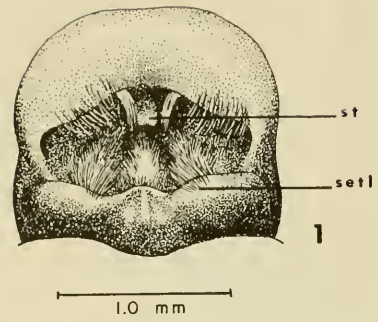
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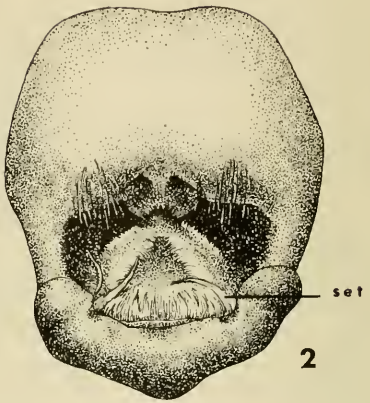
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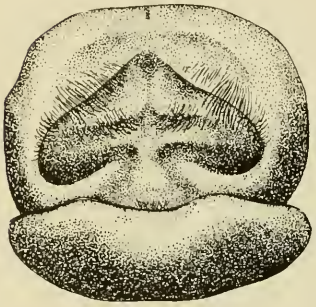
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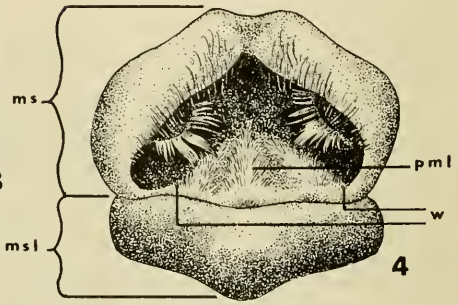
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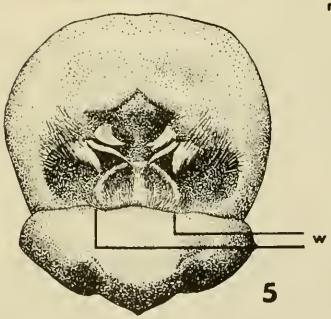
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for the usual failure of females to respond to the courtship of heterospecific males (Walker 1963).

The morphology and histology of the oecanthine metanotal gland are described by Engelhardt (1914) for *Oecanthus pellucens* (Scopoli) and by Fulton (1915) for an unspecified species of *Oecanthus* (probably *nigricornis* or *quadripunctatus*). Males of some species in other gryllid subfamilies have metanotal glands—Gryllinae, *Discoptila fragosoi* (Bolivar) (Boldyrev 1928); Phalangopsinae, *Homoeogryllus* (LeRoy 1964); Eneopterinae, *Tafalisca, Hapithus* (TJW). However, only in Oecanthinae are the glands large and complex and present in all species examined. The chief parts of the metanotal gland in Oecanthinae are a metascutum (Fig. 4, *ms*) and metascutellum (*msl*), henceforth referred to here as "scutum" and "scutellum." A well-defined and distinctive posterior median lobe of the scutum (Fig. 4, *pml*) occurs in some species but not in others; it is henceforth termed "posterior median scutal lobe."

L. Chopard and A. B. Gurney were first to examine oecanthine metanotal glands for their taxonomic value: Chopard (1955, Fig. 30–32) pointed out that three similar species of African *Oecanthus* differed in features of the gland. Gurney, in 1951, examined many New World species of *Oecanthus* and drawings were made (including Fig. 1–6 of this paper). Because of uncertainties in the taxonomy and nomenclature of U. S. *Oecanthus* he did not publish his results. These uncertainties were subsequently dealt with by Walker (1962, 1963).

As a result of Gurney's work with *Oecanthus*, Walker (1967, Fig. 20–27) studied the metanotal glands of the oecanthine genus *Neoxabea*, discovered features of taxonomic value, and illustrated the glands of eight species.

The present paper summarizes the early studies by Gurney and the later studies by Walker of the metanotal glands of U. S. *Oecanthus*.

Methods. Five or more specimens of each U. S. species (except *laricis*) and closely related Latin American species were examined. Specimens from diverse localities were selected to maximize intraspecific variation. Pinned specimens were relaxed, and their metanotal

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Fig. 1–9. Male metanotum of *Oecanthus*. Fig. 1–5, Dorsal view of scutum and scutellum (scale beneath Fig. 1). Fig. 1. *niveus*, specimen from Geneva, N. Y.; fig. 2, *exclamationis*, Johnson City, Tenn.; fig. 3, *nigricornis*, Glen Echo, Md.; fig. 4, *californicus*, Huachuca Mts., Ariz.; fig. 5, *allardi*, Ciudad Trujillo [Santo Domingo], Dominican Republic; fig. 6, Posterior median scutal lobe of *rileyi* (Locality of figured specimen uncertain, probably Corvallis, Oreg.); fig. 7–9, Caudal view of scutellum (small portions of scutum showing, scale as in fig. 1); fig. 7, *exclamationis*, Gainesville, Fla.; fig. 8, *leptogrammus*, Brownsville, Tex., fig. 9, *niveus*, Highlands Co., Fla. *ms*—metascutum (scutum), *msl*—metascutellum (scutellum), *pml*—posterior median lobe of scutum, *set*—setae on scutum at scutoscutellar suture, *setl*—setae on scutellum, *st*—scutal tubercle, *w*—width of posterior median scutal lobe.

glands were exposed by elevating and pulling forward the tegmina. They were then dried in this position. In alcohol-preserved specimens, the glands were exposed by amputating the tegmina.

Results. Among U. S. species of *Oecanthus* the scutellum is not elaborately modified as in most species of *Neoxabea* (Walker 1967), nor is there, except in *O. niveus*, a well-developed median scutal tubercle (Fig. 1, *st*) such as Chopard (1955) found useful in identifying African *Oecanthus*. However, as the following key and accompanying figures illustrate, features of the metanotal glands may be used to separate the species into the same species groups that have been recognized on the basis of other features such as antennal markings, calling song, and stridulatory file (Walker 1962). Features of the metanotal gland, especially the lack of brushes or bundles of long setae on the scutum at the scutoscutellar suture or on the scutellum, indicate that species related to *rileyi* are not closely related to *niveus*. Therefore, the *rileyi* group of species is here recognized as distinct from the *niveus* group. Although Walker (1962) considered these to be a single group, features of the antennal markings, calling song, and stridulatory file support the present division.

In general, species within a species group are difficult or impossible to separate on the basis of the metanotal gland, and other characteristics are adequate for identification. However, as indicated in couplets 4 and 5 of the key, within the *niveus* group the metanotal gland easily separates species that in a few instances are difficult to separate by other means. Indeed, the differences in the glands within the *niveus* group are as great as the differences used to separate the other species into species groups.

Oecanthus fultoni shows significant geographical variation in the structure of the metanotal gland. West Coast specimens have a posterior median scutal lobe similar to that of *O. rileyi*, and eastern specimens resemble the West Indian *O. allardi* in this respect.

KEY TO U.S. **Oecanthus** SPECIES, BASED ON MALE METANOTAL GLANDS

1. Brushes or bundles of long setae on scutum at scutoscutellar suture (Fig. 2, *set*) or on scutellum (Fig. 1, *setl*) ..... **niveus** group 4

1′ No setal brushes or bundles on scutum at scutoscutellar suture nor on scutellum (Fig. 3, 4, 5) 2

2 (1′) Scutum with posterior median lobe (Fig. 4, 5) 3

2′ Scutum without posterior median lobe (Fig. 3) ..... **nigricornis** group, including **argentinus** Saussure, **celerinictus** T. Walker, **laricis** T. Walker, **nigricornis** F. Walker, **pini** Beutenmuller, and **quadripunctatus** Beutenmuller

3 (2) Width of posterior median scutal lobe (Fig. 4, *w*) twice length or more; anterior edge of lobe describing a shallow arc (Fig. 4) ..... **varicornis**

group, including **californicus** Saussure, **latipennis** Riley, **major** T. Walker, and **varicornis** F. Walker

3′ Width of posterior median scutal lobe (Fig. 5, *w*) twice length or less; anterior edge of lobe describing a semicircle (Fig. 5) or a circumflex (∧) (Fig. 6) ..... **rileyi** group, including **allardi** T. Walker & Gurney, **fultoni** T. Walker, and **rileyi** Baker

4 (1) Pair of vertical, bent-tip, setal bundles on scutum at scutoscutellar suture (Fig. 7) ..... **exclamationis** Davis

4′ No setal bundles at scutoscutellar suture 5

5 (4′) Scutellum with a pair of forward-directed horn-like processes; pair of setal brushes on scutum at scutellar processes (Fig. 8) ..... **leptogrammus** T. Walker

5′ Scutellum without horn-like processes; pair of setal brushes on scutellum (Fig. 9) ..... **niveus** (De Geer)

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STUDIES OF NEOTROPICAL CADDIS FLIES, VI: ON A COLLECTION FROM NORTHWESTERN MEXICO

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One of the more interesting and well-known zoogeographic facts is the intermingling of the Nearctic and Neotropical faunas in Mexico. It has been known for a long time that Nearctic elements enter Mexico via the central highlands, but become greatly reduced south of the trans-Mexican volcanic belt just south of Mexico, D. F., although a few elements keep reappearing on the high mountains as far south as Costa Rica. Conversely, Neotropical elements enter Mexico from the south and extend northward to greater or lesser degrees in the lowland regions of the Pacific and Gulf coasts. Complicating this pattern are the effects of rainfall, elevation, and the ecological requirements of the group involved.

The Trichoptera show this intermingling of faunas in Mexico in a clear manner. The northern elements enter Mexico along the Sierra Madre Occidental, but the large desert area generally bars the caddis flies from the high region to the east of the mountains. In the warmer streams of the coastal lowlands just to the west of the mountains are found many species, probably of Neotropical origin, which are widely distributed in Central America and which are also found in many of the warmer streams in the western United States. Confusing this picture are certain genera, apparently of Neotropical origin (*Atopsyche* and *Marilia*, at least) which have become cool-adapted, and extend northward along the same mountains which are inhabited by the Nearctic groups.

The collection upon which this report is based, made by a group from the Canadian Department of Agriculture, is the most important collection made in the "Nearctic" section of northwestern Mexico. The material is mainly from the high mountains of Durango, and serves to link the relatively well-known areas in Arizona with the region near Mexico City. It is not surprising therefore that there are many records extending the known ranges of Arizonan species far to the south and a smaller number extending ranges from near Mexico City to the northwest.

All specimens which are listed from the base camp without more specific locality data are from a site located at 9000 feet elevation, 10 miles west of El Salto, Durango, Mexico. They were collected primarily by J. E. H. Martin, with smaller numbers taken by J. F. McAlpine, W. C. McGuffin, and H. F. Howden. A brief discussion of

the site, its weather and ecology may be found in Thomas (1966, Can. Ent. 98: 871–875).

Holotypes and allotypes are deposited in the Canadian National Collection. Paratypes and material of the described species are divided between the Canadian National Collection and the U.S. National Museum. I wish to thank Dr. Fernand Schmid for making the collection available for my study.

In addition to the material specifically reported on here, there are females in the genera *Atopsyche, Chimarra, Polycentropus, Cheumatopsyche, Hydropsyche,* and *Lepidostoma* which are not determined to species. It is not presently possible to be certain of the correct association of males and females for the majority of the species in these genera.

RHYACOPHILIDAE

Atopsyche boneti Ross and King

Atopsyche boneti Ross and King, 1952, Ann. Ent. Soc. Amer. 45: 194.

The species, described from Morelos and which I have collected near Cordoba, Ver., is here recorded from northwestern Mexico for the first time. Base Camp: 6 July 1964, 1♂.

Atopsyche calopta Ross and King

Atopsyche calopta Ross and King, 1952, Ann. Ent. Soc. Amer. 45: 188.

A single male of this species was collected at the Base Camp on 13 June 1964. The original material came from the states of Morelos, Oaxaca, and Chiapas.

Atopsyche sperryi Denning

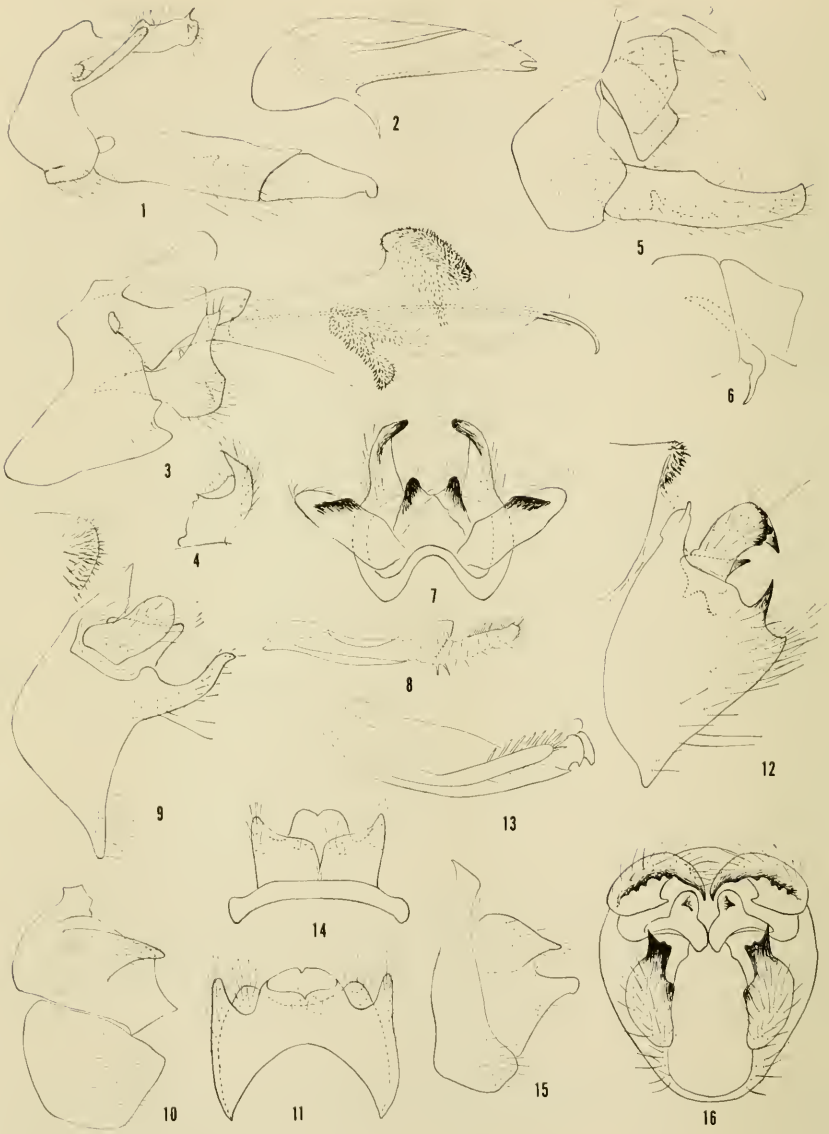
Atopsyche sperryi Denning, 1949, J. Kans. Ent. Soc. 22: 88. Ross and King, 1952, Ann. Ent. Soc. Amer. 45: 190.

This species was previously known only from Arizona. Base Camp: 20 April 1964, 1♂; 8 June 1964, 2♂; 9 June 1964, 3♂; 11 June 1964, 1♂; 13 June 1964, 2♂; 17 June 1964, 4♂; 18 June 1964, 1♂; 20 June 1964, 1♂; 25 June 1964, 2♂; 27 June 1964, 1♂; 1 July 1964, 2♂; 15 July 1964, 3♂; 29 July 1964, 3♂; 31 July 1964, 1♂; 5 Aug. 1964, 1♂; 8 Aug. 1964, 1♂. Durango, 5 miles west El Salto, 7 June 1964, 1♂.

Atopsyche tripunctata Banks

Atopsyche tripunctata Banks, 1905, Trans. Amer. Ent. Soc. 32: 17. Ross, 1947, Trans. Amer. Ent. Soc. 73: 128. Ross and King, 1952, Ann. Ent. Soc. Amer. 45: 190.

Similarly to the preceding species, this species was known only from Arizona. Base Camp: 8 June 1964, 2♂; 16 June 1964, 1♂; 18 June 1964, 1♂; 26 June 1964, 1♂; 28 June 1964, 3♂; 6 July 1964, 1♂; 7 July 1964, 1♂; 8 July 1964, 4♂; 29 July 1964, 1♂; 31 July 1964, 1♂; 1 Aug. 1964, 2♂; 2 Aug. 1964, 1♂; 8 Aug. 1964, 1♂.



Figs. 1–16. *Atopsyche socialis*, n. sp.: 1, male genitalia, lateral; 2, aedeagus, lateral. *Chimarra bicoloroides*, n. sp.: 3, male genitalia, lateral; 4, clasper, dorsal. *Polycentropus palmitus*, n. sp.: 5, male genitalia, lateral; 6, aedeagus, lateral. *Limnephilus pollux*, n. sp.: 7, male genitalia, dorsal; 8, aedeagus, lateral; 9, male genitalia, lateral; 10, female genitalia, lateral; 11, female genitalia, dorsal. *Limnephilus ctenifer*, n. sp.: 12, male genitalia, lateral; 13, aedeagus, lateral; 14, female genitalia, dorsal; 15, female genitalia, lateral; 16, male genitalia, posterior.

Atopsyche socialis, n. sp.
(Figs. 1–2)

This species is closely related to *A. tripunctata* Banks, from which it differs in the shape of the paracercus and in the structure of the aedeagus which lacks the bifurcate dorsal process but has a divided tip.

Adult. Length of forewing, 10–11 mm. Color grayish brown; forewings mottled brown, paler in anal region. Sixth sternum with apicomesal process about a third of length of segment; seventh sternum with apicomesal process about a fifth of length of segment. *Male genitalia*: Filicercus elongate, clavate, shorter than paracercus. Paracercus slender, with a dorsal subapical tooth and dorsal and lateral apical teeth. Basal clasper segment long, inner surface with a shelf ending in a short apical process; apical segment trianguloid, dorsoapical margin inrolled. Aedeagus with a strong lateral spine, apex split into dorsal and ventral points, a simple internal rod present.

Holotype, male. Mexico (Durango), 10 miles west of El Salto, 9000′, 11 Aug. 1964, J. E. H. Martin. Paratypes. Same, but 8 June 1964, 1♂; 17 June 1964, 3♂; 25 June 1964, 1♂; 8 July 1964, 1♂; 10 July 1964, 2♂.

GLOSSOSOMATIDAE

Glossosoma ventrale Banks

Glossosoma ventrale Banks, 1904, Trans. Amer. Ent. Soc. 30: 109. Ross, 1956, Evol. & Classif. Mtn. Caddisfl., p. 153, fig. 301. Fischer, 1960, Trich. Catal. 1: 24.

There is a single female collected at the Base Camp on 6 Aug. 1964 apparently belonging to this species. This is the first record of the species, genus, and subfamily (Glossosomatinae) in Mexico.

PHILOPOTAMIDAE

Wormaldia arizonensis (Ling)

Dolophilus arizonensis Ling, 1938, Pan-Pac. Ent. 14: 63. Ross, 1941, Trans. Amer. Ent. Soc. 67: 51. Fischer, 1961, Trich. Catal. 2: 46.

Wormaldia arizonensis (Ling): Ross, 1949, Proc. Ent. Soc. Wash. 51: 155. Ross, 1956, Evol. & Classif. Mtn. Caddisfl., p. 62, fig. 74.

These are the first records of this species in Mexico. Base Camp: 8 June 1964, 1♂ 1♀; 13 June 1964, 1♀; 17 June 1964, 1♂ 1♀; 1 July 1964, 1♂; 6 July 1964, 1♂; 10 July 1964, 1♀; 12 July 1964, 1♀. Durango: 5 miles west of El Salto, 7 June 1964, 1♀; 3 miles west of El Salto, 19 June 1964, 1♂.

Chimarra bicolor (Banks)

Philopotamus bicolor Banks, 1901, Trans. Amer. Ent. Soc. 27: 370. Fischer, 1961, Trich. Catal. 2: 6.

Chimarra bicolor (Banks): Flint, 1967, Proc. U.S.N.M., vol. 123, no. 3619, p. 3.

One female of this Mexican species from Sinaloa, 15 miles west of El Palmito, 5000′, 20 July 1964.

Chimarra bicoloroides, n. sp.
(Figs. 3–4)

In coloration this species is similar to *C. bicolor* (Banks), however, only the head and pronotum are orange whereas the whole body is orange in *bicolor*. The structure of the male genitalia places this species in a very isolated position. The presence and shape of the dorsal and lateral lobes of the tenth tergum together with the extremely long spines in the aedeagus render the genitalia very distinctive.

Adult. Length of forewing, 9 mm. Head, pronotum, and forecoxae orange; rest of body, wings and appendages fuscous. *Male genitalia*: Ninth segment with a midventral keel. Clasper with a narrow dorsal prolongation ending in a sharp point, mesal surface with a distinctive central ridge dividing the thick basal from the thin apical portion. Tenth tergum divided into broad, rectangular dorsal plates, and more elongate lateral plates. Aedeagus (completely everted in type) with an extremely long internal spine overlying a long trough-like ventral spine; membranous apex with dorsal and ventral spiculate patches.

Holotype, male. Mexico (Durango), 10 miles west of El Salto, 9000′, 28 July 1964, J. E. H. Martin.

Chimarra embia Ross

Chimarra embia Ross, 1959, Ent. News 70: 170.

There is a single male of this common Mexican species. Sinaloa, 21 miles east of Villa Union, 25 July 1964.

Chimarra mexicana (Banks)

Rhyacophila mexicana Banks, 1900, Trans. Amer. Ent. Soc. 26: 259.
Chimarra mexicana (Banks): Flint, 1967, Proc. U.S.N.M., vol. 123, no. 3619, p. 3.

This distinctively marked species is recorded from the northwestern part of Mexico for the first time. Base Camp: 11 June 1964, 1♂; 17 June 1964, 7♂ 1♀; 25 June 1964, 2♂.

Chimarra utahensis (Ross)

Chimarrha utahensis Ross, 1938, Bull. Ill. Nat. Hist. Surv. 21: 134.
Chimarra utahensis (Ross): Ross, 1951, Proc. Cal. Acad. Sci. (4th Ser.) 27: 67.

This species, known from the southwestern United States and Baja California, is recorded from Mexico proper for the first time. Durango, 7 miles west of Durango, 7000′, 26 July 1964, 1♂.

PSYCHOMYIIDAE

Polycentropus arizonensis Banks

Polycentropus arizonensis Banks, 1905, Trans. Amer. Ent. Soc. 32: 85.
Ross, 1938, Psyche 45: 13. Denning, 1956, Pan-Pac. Ent. 32: 80.
Fischer, 1962, Trich. Catal. 3: 66.

Known previously only from New Mexico and Arizona, this species is recorded from Mexico for the first time. Base Camp: 8 June 1964, 1♂; 13 June 1964, 1♂; 16 June 1964, 1♂; 20 June 1964, 1♂; 2 July 1964, 1♀; 10 July 1964, 1♀; 24 July 1964, 1♀; 31 July 1964, 1♀.

Polycentropus aztecus Flint

Polycentropus aztecus Flint, 1967, Proc. U.S.N.M., vol. 123, no. 3608, p. 9.

The following are paratypes of this recently described species. Base Camp: 25 June 1964, 1♂; 15 July 1964, 1♂; 28 July 1964, 1♂; 29 July 1964, 2♂; 6 Aug. 1964, 1♂.

Polycentropus casicus Denning

Polycentropus casicus Denning, in Denning & Sykora, 1966, Can. Ent. 98: 1222.

There is a topotypic pair of this common, widespread, Mexican species. Durango, 24 miles west of La Ciudad, 15 June 1964, 1♂ 1♀.

Polycentropus halidus Milne

Polycentropus halidus Milne, 1936, Studies N. Amer. Trich. 3: 86. Denning, 1948, Psyche 55: 23. Denning & Sykora, 1966, Can. Ent. 98: 1220.

This species is known otherwise from New Mexico, Arizona, California and Mexico. Base Camp: 13 June 1964, 1♂; 17 June 1964, 2♂; 20 June 1964, 1♂; 25 June 1964, 2♂; 28 June 1964, 1♂; 5 July 1964, 1♂. Durango, 2 miles west of El Salto, 19 June 1964, 1♂.

Polycentropus palmitus, n. sp.
(Figs. 5–6)

This species is close to *P. halidus* Milne, from which it differs in lacking the hooklike appendage from the inner lobe of the cercus, and in having longer, narrower claspers.

Adult. Length of forewing, 6.5 mm. Color brown; body and appendages slightly paler, forewing spotted with patches of golden hair. *Male genitalia*: Cercus divided into 3 parts: a broad dorsolateral lobe, an inner slightly more elongate ventral lobe, and a dorsal saber-like process. Clasper long and slender, tip slightly upturned, inner face with a slight ridge, culminating in a basal tooth. Aedeagus broad, with an apicoventral process, trianguloid in posterior aspect, and dorsolateral plates.

Holotype, male. Mexico (Sinaloa), 8 miles west of El Palmito, 19 July 1964, H. F. Howden.

Polycentropus picana Ross

Polycentropus picana Ross, 1947, Trans. Amer. Ent. Soc. 73: 136. Denning, 1966, Pan-Pac. Ent. 42: 232.

This species, which is common and widely distributed in northeastern and central Mexico, is recorded from northwestern Mexico for the first time. Durango, 7 miles west of Durango, 7000′, 26 July 1964, 1♂ 1♀.

HYDROPSYCHIDAE

Smicridea fasciatella McLachlan

Smicridea fasciatella McLachlan, 1871, J. Linn. Soc. Lond., Zool. 11: 136. Ross, 1944, Bull. Ill. Nat. Hist. Surv. 23: 85.
Fischer, 1963, Trich. Catal. 4: 132.

This common species is widespread in southwestern United States and northern Mexico. Sinaloa: 28 miles east Villa Union, 500′, 4 Aug. 1964, 2♀; 21 miles east Villa Union, 25 July 1964, 3♂ 3♀.

Smicridea utico Ross

Smicridea utico Ross, 1947, Trans. Amer. Ent. Soc. 73: 144.

This is another common species in Central America, Mexico, and the southwestern United States. Sinaloa: 21 miles east of Villa Union, 25 July 1964, 1♂; 28 miles east of Villa Union, 500′, 4 Aug. 1964, 1♀.

Cheumatopsyche gelita Denning

Cheumatopsyche gelita Denning, 1952, Can. Ent. 84: 20.

Known previously only from the type series collected in Arizona, the species is here recorded from Mexico. Base Camp: 25 June 1964, 1♂.

Cheumatopsyche zion Ross

Cheumatopsyche zion Ross, 1947, Trans. Amer. Ent. Soc. 73: 141.

The species is widely distributed over the southwestern United States, and is here recorded from Mexico for the first time. Base Camp: 4 July 1964, 1♀; 29 July 1964, 1♀; 6 Aug. 1964, 1♂.

Hydropsyche solex Ross

Hydropsyche solex Ross, 1944, Bull. Ill. Nat. Hist. Surv. 23: 271.

This species seems to have a widespread distribution throughout the more arid areas of western United States, but has not been recorded from Mexico previously. Durango: 5 miles west of Durango, 6500′, 29 June 1964, 1♂ 2♀; 7 miles west of Durango, 7000′, 26 July 1964, 4♀.

Hydropsyche oslari Banks

Hydropsyche oslari Banks, 1905, Trans. Amer. Ent. Soc. 32: 13. Ross, 1938, Psyche 45: 18. Fischer, 1963, Trich. Catal. 4: 65. Denning, 1964, Pan-Pac. Ent. 40: 133.

This common and widespread western North American species has been known in Mexico previously only from Baja California. Base Camp: 6 June 1964, 1♂; 8 June 1964, 3♂; 17 June 1964, 2♂; 25 June 1964, 2♂; 1 July 1964, 1♂; 2 July 1964, 2♂, 29 July 1964, 1♂.

Hydropsyche occidentalis Banks

Hydropsyche occidentalis Banks, 1900, Trans. Amer. Ent. Soc. 26: 258. Ross, 1938, Psyche 45: 17. Fischer, 1963, Trich. Catal. 4: 58. Denning, 1964, Pan-Pac. Ent. 40: 133.

This species has a range like that of the preceding. Base Camp: 5 June 1964, 1♂; 9 June 1964, 2♂; 2 July 1964, 1♂; 4 July 1964, 2♂; 17 July 1964, 1♂.

LIMNEPHILIDAE

Limnephilus rothi Denning

Limnephilus rothi Denning, 1966, Pan-Pac. Ent. 42: 235.

This species, recently described from southern Arizona, is recorded from Mexico for the first time. Base Camp: 9 June 1964, 1♂; 16 June 1964, 1♀; 17 June 1964, 1♀; 18 June 1964, 1♂ 1♀; 29 June 1964, 1♀; 10 July 1964, 1♂; 22 July 1964, 1♂; 25 July 1964, 1♀.

Limnephilus pollux, n. sp.
(Figs. 7–11)

This species is related to *morrissoni* and *castor*; from both it is easily separated by the much reduced tenth tergites, and from *castor* by the more elongate claspers.

Adult. Length of forewing, male 12–14 mm., female 13–15 mm. Forewings brown, with considerable white fenestration around anastamosis, and with oblique paler mark basad. Basal tarsal segment of foreleg about 1½ times length of second segment. Spurs yellow, 1, 3, 4; foretibia and femur without dark spinulose bands. *Male genitalia*: Eighth tergum produced into a bilobate process covered with dark spicules. Ninth segment narrow ventrally; clasper completely united to posterior margin of segment, but dorsally produced into a long, finger-like lobe whose apex is directed mesad. Cercus elongate, directed laterad, margins subparallel, mesal face with a slightly produced, black, rugose stripe. Tenth tergite a compressed trianguloid plate, dorsal margin darkened apically. Aedeagus with lateral arms membranous apically, with dorsal margin bearing a dense fringe of setae. *Female genitalia*: Ninth sternum slightly produced apicolaterally, in ventral aspect broadly and shallowly emarginate mesally. Cercus fused to tenth segment, but produced as a pair of short acute lobes, tenth segment a short tube.

Holotype, male. Mexico (Durango), 10 miles west of El Salto, 9000′. 17 July 1964, J. E. H. Martin. Allotype, female. Same data. Paratypes. Same but, 8 June 1964, 3♂; 17 June 1964, 1♀; 4 July 1964, 1♀; 8 July 1964, 1♂ 1♀.

Limnephilus toussainti Banks

Limnephilus toussianti Banks, 1924, Bull. Mus. Comp. Zool. 65: 439.
Limnephilus toussainti Banks: Flint, 1963, Proc. Ent. Soc. Wash. 65: 211.

The original spelling of the specific name is an obvious misspelling of the name of the Haitian general Toussaint, and was emended in 1963, but without comment.

The type of this species bears a label indicating it is from Port-au-Prince, Haiti, Wm. Mann. This is apparently a mislabelled specimen. During conversations with Dr. Westfall I have learned that there are several Odonata with similar labels, but which are actually from central Mexico. The specimens are from the base camp on 13 June 1964, 1♂; 17 June 1964, 1♀; 29 June 1964, 1♂; 2 July 1964, 1♀.

Limnephilus ctenifer, n. sp.
(Figs. 12–16)

This is a species belonging to the *diversus* group, but which is easily recognized by the shape of the clasper, cercus, and dorsal armature of the lateral arms of the aedeagus.

Adult. Length of forewing, 9–10 mm. Color almost uniformly brown, forewings with darker flecks along veins, and with membrane faintly irrorate. Basal tarsal segment of forelegs subequal in length to second segment; forefemur with a shallow groove on ventral face, both this and ventral surface of foretibia densely covered with black spicules; apex of foretibia with a broad hoodlike process, if this is a true spur, then formula is 1, 3, 4. *Male genitalia*: Eighth tergum with a small triangular, apicomesal, spiculate patch. Ninth segment broad laterally, with clasper united to posterior margin and bearing an upright, darkened, pointed process. Cercus elongate, tapering to a mesally directed point, with posterior margin dark and dentate. Tenth tergite with a small, posteriorly-directed, dark point arising from a large flat base. Aedeagus with heavily sclerotized lateral arms bearing an apicodorsal comb of spines, and apicoventrally bearing slender setae. *Female genitalia*: Ninth segment continuous dorsally, gradually widened ventrally. Cercus in lateral aspect a pointed lobe, dorsally an almost continuous broad plate. Tenth segment a slightly longer tube, emarginate mesally.

Holotype, male. Mexico (Durango), 10 miles west of El Salto, 9000′, 26 June 1964, W. C. McGuffin. Allotype, female. Same but, 25 June 1964, J. E. H. Martin. Paratypes. Same but, 17 June 1964, 1♀; 21 June 1964, 1♀; 25 June 1964, 2♀; 29 June 1964, 2♂ 1♀; 1 July 1964, 1♂; 4 July 1964, 1♂; 7 July 1964, 1♀; 17 July 1964, 1♂.

Limnephilus biparta Denning

Limnephilus biparta Denning, 1966, Can. Ent. 98: 1223.

This species, recently described from specimens taken at the base camp, is apparently rather common there. Base Camp: 9 June 1964, 1♂; 25 June 1964, 2♀; 28 June 1964, 2♂; 29 June 1964, 2♀; 30 June 1964, 1♀; 1 July 1964, 1♂ 3♀; 2 July 1964, 2♀; 4 July 1964, 1♀; 6 July 1964, 4♂ 1♀; 8 July 1964, 3♂ 2♀; 10 July 1964, 1♂ 2♀; 11 July 1964, 1♀; 12 July 1964, 5♂ 5♀; 15 July 1964, 1♂ 2♀; 17 July 1964, 1♀; 18 July 1964, 1♂ 1♀; 23 July 1964, 3♂; 28 July 1964, 2♂ 5♀; 29 July 1964, 8♂; 30 July 1964, 3♂; 31 July 1964, 3♂ 1♀; 1 Aug. 1964, 3♂ 1♀; 3 Aug. 1964, 1♂; 5 Aug. 1964, 1♂ 1♀; 8 Aug. 1964, 7♂; 9 Aug. 1964, 5♂ 3♀; 10 Aug. 1964, 1♂.

Limnephilus mexicanus, n. sp.
(Figs. 17–21)

This is a species of the *assimilis* group, close to *L. frijole* Ross. It is recognized by the lack of a mesal tooth on the cercus and the presence of a dorsal comb of spines on the lateral arms of the aedeagus.

Adult. Length of forewing, male 10–12 mm., female 11–14 mm. Color brown, forewing irrorate with darker brown, veins spotted with dark brown. Basal segment of foretarsus of male half length of second segment; femur and tibia of foreleg with mesal surface bearing a row of dark spicules; spurs 0, 2, 3. *Male genitalia*: Eighth tergum with an apicomesal patch of dark spicules. Ninth segment moderately expanded laterally. Clasper united to ninth segment, extending posteriad, about as broad as long, with dorsal margin flat. Cercus narrow and elongate, dorsomesal margin slightly inrolled, without mesal tooth. Tenth tergite about as long as broad, tapering to an upturned apical point. Aedeagus with lateral arms heavily sclerotized, dorsal margin with a comb of enlarged setae, ventrally with thin setae. *Female genitalia*: Ninth segment incomplete dorsally, almost twice as high as long. Cercus a poorly defined dorsolateral swelling on tenth segment. Tenth segment tubular, slightly prolonged ventrally.

Holotype, male. Mexico (Durango), 10 miles west of El Salto, 9000′. 8 June 1964, J. E. H. Martin. Allotype, female. Same data. Paratypes. Same but, 6 June 1964, 1♂ 2♀; 8 June 1964, 8♂ 6♀; 11 June 1964, 2♀; 13 June 1964, 3♂ 3♀; 16 June 1964, 3♂; 17 June 1964, 2♂ 5♀; 18 June 1964, 3♂ 2♀; 20 June 1964, 3♂; 24 June 1964, 1♀; 26 June 1964, 1♂; 28 June 1964, 2♀; 29 June 1964, 1♀; 1 July 1964, 2♀; 15 July 1964, 1♂. Durango: 3 miles west El Salto, 8500′, 19 June 1964, 1♂ 1♀; Buenos Aires, 10 miles west La Ciudad, 9000′, 11 June 1964, 1♀.

Clistoronia graniculata (Denning), n. comb.

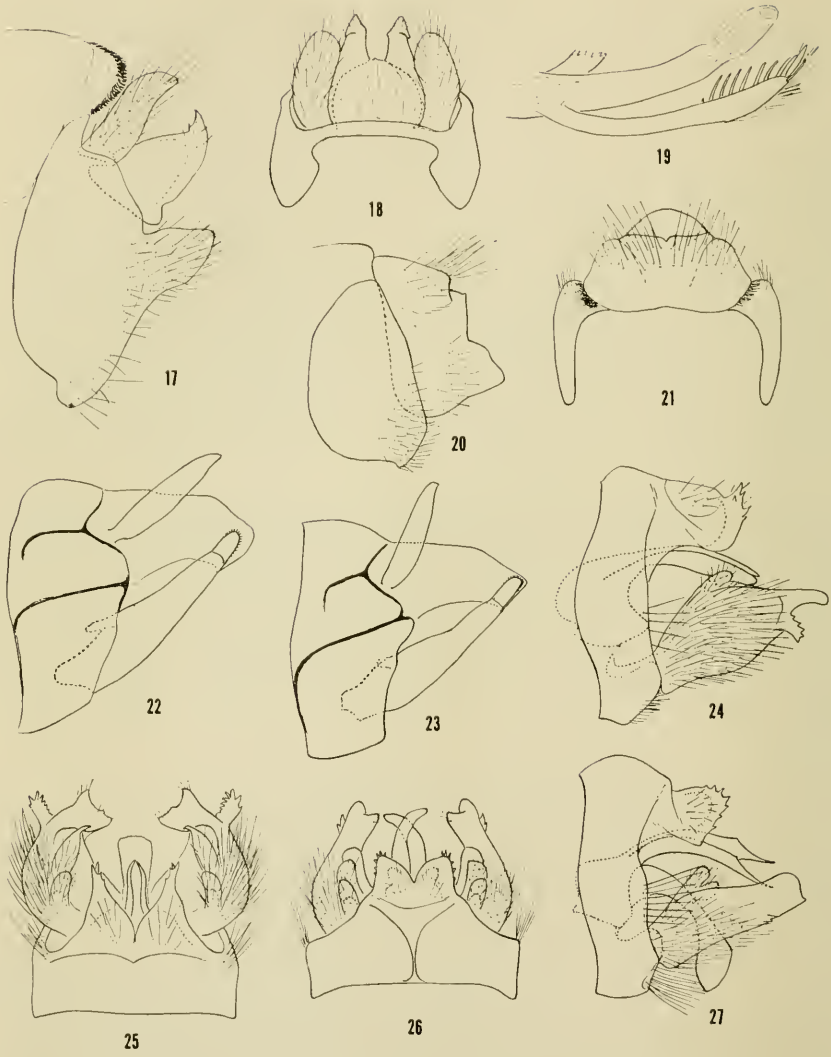
Limnephilus graniculata Denning, 1966, Can. Ent. 98: 1223.

This species, recently described from specimens taken at the base camp, is clearly a member of the genus *Clistoronia*. The many small pale spots found on the forewings of the related species are nearly lacking in this species.

The species is common at the base camp: 5 June 1964, 1♀; 6 June 1964, 4♀; 8 June 1964, 2♀; 9 June 1964, 1♀; 11 June 1964, 1♀; 16 June 1964, 3♀; 17 June 1964, 1♀; 20 June 1964, 1♀; 25 June 1964, 1♀; 26 June 1964, 1♂; 29 June 1964, 1♀; 1 July 1964, 1♀; 5 July 1964, 1♀; 6 July 1964, 1♂; 7 July 1964, 2♂; 9 July 1964, 1♂ 1♀; 12 July 1964, 2♀; 17 July 1964, 1♀; 18 July 1964, 1♂; 22 July 1964, 2♂; 28 July 1964, 2♂ 2♀; 29 July 1964, 1♂ 1♀; 30 July 1964, 1♂ 1♀; 31 July 1964, 2♂ 1♀; 1 Aug. 1964, 1♂ 4♀; 3 Aug. 1964, 1♂; 4 Aug. 1964, 1♂; 7 Aug. 1964, 1♀; 8 Aug. 1964, 3♂ 1♀; 9 Aug. 1964, 1♂; 11 Aug. 1964, 1♀.

Hesperophylax magnus Banks

Hesperophylax magnus Banks, 1918, Bull. Mus. Comp. Zool. 62: 20. Ross, 1938,



Figs. 17–27. *Limnephilus mexicanus*, n. sp.: 17, male genitalia, lateral; 18, male genitalia, dorsal; 19, aedeagus, dorsolateral; 20, female genitalia, lateral; 21, female genitalia, dorsal. *Marilia* "A": 22, male genitalia, lateral. *Marilia* "B": 23, male genitalia, lateral. *Lepidostoma laciuatum*, n. sp.: 24, male genitalia, lateral; 25, male genitalia, dorsal. *Lepidostoma rectangulare*, n. sp.: 26, male genitalia, dorsal; 27, male genitalia, lateral.

Psyche 45: 32. Banks, 1943, Bull. Mus. Comp. Zool. 92: 348. Ross, 1944, Bull. Ill. Nat. Hist. Surv. 23: 280.

This species, known from the southwestern United States, is recorded from Mexico for the first time. Base Camp: 6 June 1964, 1♀; 13 June 1964, 1♂; 16 June 1964, 1♀; 17 June 1964, 1♀; 1 July 1964, 1♂; 4 July 1964, 1♀; 11 July 1964, 1♂; 17 July 1964, 1♂.

ODONTOCERIDAE

Marilia flexuosa Ulmer

Marilia flexuosa Ulmer, 1905, Ann. Hofm. Wien 20: 70. Ross, 1941, Trans. Amer. Ent. Soc. 67: 100. Ross, 1951, Proc. Cal. Acad. Sci. (4th Ser.) 27: 71. Denning, 1964, Pan-Pac. Ent. 40: 134. Fischer, 1965, Trich. Catal. 6: 33.

This species is widely distributed, being reported from Texas to Brazil. Previous Mexican records are from Vera Cruz (Ross, 1941) and Baja California (Ross 1951, Denning 1964). Base Camp: 9 June 1964, 1♂; 4 July 1964, 1♀.

Marilia species

In *Marilia* in the Neotropical Region there exists an extremely confusing complex of "species" whose genitalia are all very similar. There are slight differences between each "species" not only in the genitalia, but also in the coloration. However, I had not been able to take the exact same "species" at two locations, which made me think that there might be only one (or a very few) species existing in rather isolated populations. However, there are two "species" in the collection from the base camp, which make me wonder if they are not distinct after all. In order to solve this question, it will take much more material than is now available.

The following names are available for this group of species in southwestern North America and Central America: *nobsca* Milne, *mexicana* (Banks), and *crea* Mosely.

The first "species" (A), fig. 22, is distinguished by the pale hairs of the forewing having a yellowish cast, having unicolorous antennae, slightly shorter and broader claspers, and a broader apex of the tenth tergum. Base Camp: 10 June 1964, 6♂.

The second "species" (B), fig. 23, has the pale hairs grayish-white, annulate antennae, a more slender clasper, and a more constricted apex of the tenth tergum. Base Camp: 8 June 1964, 1♀; 12 July 1964, 1♀; 17 July 1964, 1♀; 6 Aug. 1964, 1♂; (also 29–30 June 1964, 3♂, Spangler coll. U.S.N.M.).

CALAMOCERATIDAE

Phylloicus ornatus (Banks)

Notiomyia ornata Banks, 1909, Ent. News 20: 342. Fischer, 1965, Trich. Catal. 6: 19.

Phylloicus ornatus (Banks): Flint, 1967, Proc. U.S.N.M., vol. 123, no. 3619, p. 17.

In coloration this specimen seems identical to the type from Texas. Sinaloa, 15 miles west of El Palmito, 5000′, 20 July 1964, 1♀.

Phylloicus aeneus (Hagen)

Macronema aeneum Hagen, 1861, Syn. Neur. N. Amer., p. 285.
Phylloicus aeneus (Hagen): Ulmer, 1905, Ann. Hofm. Wien 20: 78. Fischer, Trich. Catal. 6: 20. Flint, 1967, Proc. U.S.N.M., vol. 123, no. 3619, p. 17.

These examples, which are the large dark-winged form generally called *mexicana* (Banks), belong to *aeneus* (Hagen) as I have recently defined the species. Base Camp: 10 June 1964, 2♀. Durango, 14 miles southwest of El Salto, 8000′, 30 June 1964, 1♀.

LEPTOCERIDAE

Oecetis disjuncta (Banks)

Oecetina disjuncta Banks, 1920, Bull. Mus. Comp. Zool. 64: 351.
Oecetis disjuncta (Banks): Fischer, 1966, Trich. Catal. 7: 154. Ross, 1951, Proc. Cal. Acad. Sci. (4th ser.) 27: 74.

This species is extremely close to *avara* (Banks), but is generally larger and darker. It has been recorded (Ross, 1951) from Baja California. Base Camp: 8 June 1964, 2♀; 9 June 1964, 1♀; 11 June 1964, 1♀; 25 June 1964, 1♂; 1 July 1964, 1♂ 1♀; 2 July 1964, 1♀; 4 July 1964, 2♀; 6 July 1964, 1♀; 8 July 1964, 2♀; 15 July 1964, 1♀; 29 July 1964, 1♀.

Oecetis arizonica Denning

Oecetis arizonica Denning, 1951, J. Kans. Ent. Soc. 24: 159.

This species, which is known from southern Arizona, is here recorded from Mexico for the first time. Base Camp: 1 July 1964, 1♀; 2 July 1964, 1♂; 4 July 1964, 1♀; 20 July 1964, 1♀.

Oecetis inconspicua (Walker)

Leptocerus inconspicuus Walker, 1852, Catal. Neur. Brit. Mus. 1: 71.
Oecetis inconspicua (Walker): Betten & Mosely, 1940, Walker Types Trich., p. 67. Fischer, 1966, Trich. Catal. 7: 149.

This species is one of the commonest and most widespread New World caddis flies, being known from all over North America, the Greater Antilles, and higher elevations in Central America. Durango, 7 miles west of Durango, 7000′, 26 July 1964, 1♀.

Leptocella dorsalis Banks

Leptocella dorsalis Banks, 1901, Trans. Amer. Ent. Soc. 27: 368. Fischer, 1966, Trich. Catal. 7: 54. Flint, 1967, Proc. U.S.N.M., vol. 123, no. 3619, p. 21.

This is one of the more common Central American species of the genus. Sinaloa, 21 miles east of Villa Union, 25 July 1964, 1♂.

Leptocella gracilis Banks

Leptocella gracilis Banks, 1901, Trans. Amer. Ent. Soc. 27: 369. Fischer, 1966, Trich. Catal. 7: 51. Flint, 1967, Proc. U.S.N.M., vol. 123, no. 3619, p. 21.

The species seems common in the northern half of Mexico. The examples from Durango have a slightly darker ground color than the types, but otherwise seem identical. Durango, 7 miles west of Durango, 7000′, 26 July 1964, 1 ♂ 1 ♀.

LEPIDOSTOMATIDAE

Lepidostoma bakeri Flint

Lepidostoma bakeri Flint, 1965, Proc. Ent. Soc. Wash. 67: 175.

This species was described from southern Arizona and is here recorded from Mexico for the first time. Base Camp: 9 June 1964, 1 ♂.

Lepidostoma bispinosa (Ulmer)

Atomyiodes bispinosa Ulmer, 1911, Ann. Soc. Ent. Belg. 55: 25.
Lepidostoma bispinosa (Ulmer): Denning, 1962, Pan-Pac. Ent. 38: 39.
Lepidostoma alexanderi Denning, 1962, Pan-Pac. Ent. 38: 37 (new synonymy).

This species is found from southern Arizona to Costa Rica in the mountainous regions. It is quite variable in details of the genitalia, especially the serrations along the posterior margin of the tenth tergite and exact shape of the apex of the clasper. I have seen examples with all intergradations in serration between the one with a uniform series of small teeth (*alexanderi* type) to the one with only a few, widely spaced, large teeth (*bispinosa* type). Often the two sides of the tenth tergum are not symmetrical in this regard, one side having more teeth than the other.

There is 1 ♂ from the base camp, 17 June 1964, and 1 ♂ from Durango, 13 miles west of El Salto, 18 June 1964.

Lepidostoma knulli Ross

Lepidostoma knulli Ross, 1946, Ann. Ent. Soc. Amer. 39: 280.

Described from southern Arizona, this species is recorded from Mexico for the first time. Base Camp: 7 July 1964, 1 ♂; 8 July 1964, 1 ♂.

Lepidostoma lacinatum, n. sp.
(Figs. 24–25)

This species is a member of the *unicolor* group, probably closest to the following new species. The large, serrate apicoventral lobe and the flattened, twisted apex of the clasper are diagnostic for this species.

Adult. Length of forewing, 10–12 mm. Color brown, antennae and legs paler, forewing brown with scattered golden setae. Basal antennal segment 3 times as long as broad; maxillary palpus 1-segmented, concave mesally with specialized setae; other secondary sexual modifications lacking. *Male genitalia*: Tenth tergite with apex upturned, dentate, halves widely separated mesally.

Clasper rather broad, apex produced into a flattened plate twisted mesally, with a large serrate apicoventral lobe; basidorsal process with dorsal arm short, apical arm long and flattened, appressed to clasper, with apex produced into a hook. Aedeagus with a pair of pointed dorsal rods appressed to central tube.

Holotype, male. Mexico (Durango), 10 miles west of El Salto, 9000′, 2 July 1964, J. E. H. Martin. Paratypes. Same data, 3♂; 6 June 1964, 1♂; 8 June 1964, 2♂; 13 June 1964, 1♂; 17 June 1964, 3♂; 27 June 1964, 1♂; 7 July 1964, 1♂; 15 July 1964, 1♂; 29 July 1964, 1♂. Mexico (Sinaloa), El Palmito, 15 July 1964, J. F. McAlpine, 1♂.

Lepidostoma rectangulare, n. sp.
(Figs. 26–27)

This species is likewise a member of the *unicolor* group, and probably most closely related to the preceding species. The very broad apex and small basidorsal lobes of the clasper render this species very distinctive.

Adult. Length of forewing, 10 mm. Color brown; legs and antennae slightly paler, forewing spotted with golden hairs. Basal antennal segment about 4 times as long as broad; maxillary palpus 1-segmented, concave mesally with specialized hairs; no other sexual modifications. *Male genitalia*: Tenth tergite rounded in lateral view, with posterior margin bearing small teeth, halves broadly separated in dorsal aspect. Clasper elongate, apex broad and truncate in lateral view, with a small subapical ventral process, apex bearing a mesal lobe in dorsal aspect; basidorsal processes short. Aedeagus with 2 stout dorsal processes whose tips are angled mesad.

Holotype, male. Mexico (Durango), 10 miles west of El Salto, 9000′, 25 July 1964, W. C. McGuffin.

HELICOPSYCHIDAE

Helicopsyche mexicana Banks

Helicopsyche mexicana Banks, 1901, Trans. Amer. Ent. Soc. 27: 368. Ross, 1944, Bull. Ill. Nat. Hist. Surv. 23: 289. Denning, 1964, Pan-Pac. Ent. 40: 133.

The species is widespread in Mexico and southwestern United States. Base Camp: 17 June 1964, 1♀; 18 June 1964, 1♀; 17 July 1964, 1♂. Sinaloa, 8 miles west of El Palmito, 19 July 1964, 1♂. Chihuahua, Mesa de Huracan (108°15′, 30°4′), 7400′, 21–25 July 1964, 1♀.

A NEW BRACONID PARASITE OF THE POTATO TUBERWORM
(HYMENOPTERA)

CARL F. W. MUESEBECK, *U. S. National Museum, Washington, D.C. 20560*

Most of the species of the braconid genus *Orgilus*, all presumably internal parasites of lepidopterous larvae, are undescribed. I have undertaken a study of the North American species, in which the South American form described here is included because of its apparent establishment in California. Advance publication of this description has been requested in order that a name may be available for use in a paper now in preparation at the Citrus Research Center, Riverside, California, that deals with the biology of the parasite.

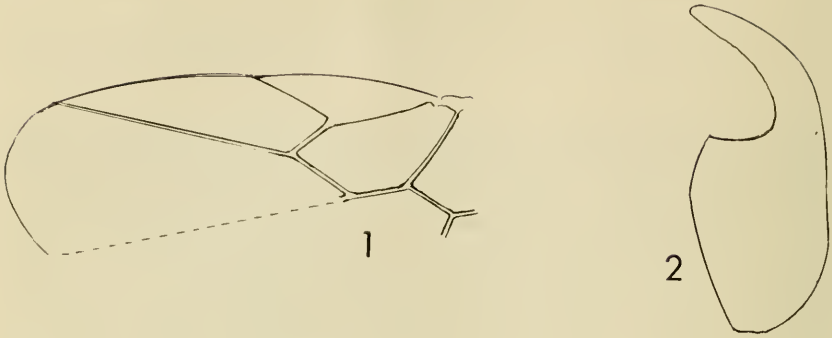
Orgilus lepidus, n. sp.

This is rather similar to *O. lateralis* (Cresson), from which it may be distinguished, however, by its smoother abdomen and by the poorly developed subbasal tooth of the tarsal claw. From the only other known South American species of the genus, *O. gossypii* Muesebeck, it differs in its relatively shorter radial cell, its smoother abdomen, much weaker dorsal keels of the first tergite and its darker coloring.

Female.—Length about 4 mm. Head not wider than thorax, in dorsal view 1.8 times as wide as long; face 1.2 times as wide as eye height, sharply punctate; malar space slightly more than one-third as long as eye height; temples gradually receding, 0.6 as wide as eyes, smooth and shining; occipital carina strong laterally, very weak medially; ocellocular line more than twice as long as diameter of an ocellus; vertex finely punctate; antennae 29- or 30-segmented in the available specimens, even the shortest segments of the flagellum slightly longer than broad.

Thorax stout; mesoscutum shining and largely smooth, with only scattered punctures; notauli weakly foveolate anteriorly, more strongly so posteriorly; disc of scutellum rather flat, polished; propodeum evenly convex, largely alutaceous to granulose with some weak, indefinite rugulae medially; side of pronotum finely roughened below the impression, smooth and polished above it; mesopleuron smooth and polished, the longitudinal furrow sinuate and finely foveolate; metapleuron largely smooth. Hind coxa evenly coriaceous and rather mat; hind femur 1.5 times as long as hind coxa and 3.8 times as long as its maximum width; inner calcarium of hind tibia slightly more than half as long as metatarsus; tarsal claw with a subbasal angulation but without a distinct subbasal tooth as in *lateralis*. Radial cell on wing margin about 1.2 times as long as stigma; second abscissa of radius nearly on a line with intercubitus; stub of third abscissa of cubitus punctiform; nervulus clearly postfurcal; lower abscissa of basella a little less than half as long as mediella or than maximum width of hind wing.

Abdomen a little narrower than thorax; first tergite nearly one and one-half times as long as broad at apex, evenly coriaceous, the dorsal keels weak and extending only slightly beyond spiracles; second tergite about 1.25 times as wide at base as long, more or less coriaceous or granulose medially, broadly



Figs. 1 and 2. *Orgilus lepidus*, n. sp. Fig. 1, part of fore wing; fig. 2, tarsal claw.

smooth laterally; third and following tergites smooth and polished; ovipositor sheath just about as long as head, thorax and abdomen combined.

Yellowish brown; antennae brownish black; palpi piceous; a spot on frons and vertex enclosing the ocelli, the mesopectus and propodeum black; tegulae and wing bases reddish yellow; wings hyaline; legs brownish yellow, the hind coxa more or less darkened inwardly toward base, and also the hind femur along its upper edge, the hind tibia blackish with a conspicuous pale annulus at extreme base, all tarsi darkened; abdomen with apex of first tergite and all of the second and third tergites usually brownish yellow, the remainder of the dorsum of the abdomen black.

Male.—Essentially like the female but usually darker, especially on the coxae. The antennae are more slender and are 28- to 30 segmented in the available specimens.

Holotype.—USNM 69536.

Described from 5 females (one, the holotype) and 5 males (one, the allotype) reared from the potato tuberworm, *Phthorimaea operculella* (Zeller), at Balcarce, Argentina; 6 females and 6 males labeled as having been reared from lepidopterous larvae on *Chenopodium* at Montivideo, Uruguay, in 1946 by H. L. Parker, and 1 female which is said to have been reared from *P. operculella* at Moreno, California, July 20, 1965, by E. R. Oatman.

CIMEX HEMIPTERUS (FABR.) FROM BATS IN COLOMBIA, SOUTH AMERICA

(HEMIPTERA: CIMICIDAE)

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The common human bed bug, *Cimex lectularius* L., is known to parasitize a wide variety of mammals and domestic birds. According to Usinger (1966) *Cimex* species originated phylogenetically from bats, but some adapted to other hosts. While *C. hemipterus* (Fabr.) is mainly a parasite of man in tropicopolitan areas, it has only been recorded a few times from bats: *Scotophilus kuhli* Leach and S. *heathii* (Horsfield) from India in 1908 and 1912, S. *temmincki* (Horsfield) from Java (Indonesia) in 1913, unidentified bat species from Java in 1932 (Usinger *loc. cit.*) and *Myotis nigricans extremus* Miller from Mexico in 1936 (Hoffman 1944). It has also been found on poultry in Jamaica and in nests of common swifts in India (Usinger *loc. cit.*).

During a survey of zoonotic diseases in Colombia, 3686 bats were examined for the presence of ectoparasites. Approximatively 400 of these were obtained from houses infested with *C. lectularius* or *C. hemipterus*. Two bats, *Peropteryx macrotis* (Wagner), collected from a hollow tree near the village of La Plata (Depart. Huila) were infested with numerous *C. hemipterus*. The parasites were firmly adhered to the skin near the dorsal part of the tail base and some of them were inflated with the hosts blood. None of the bats examined showed infestation with other species of Cimicidae.

Some Cimicidae are capable of transmitting trypanosomes among bats (Van Den Berghe *et al.* 1963) and human bedbugs have been suspected of being able to transmit *Trypanosoma cruzi*. Because both man and bats often harbor *T. cruzi* in Colombia (Marinkelle 1966), the finding of *C. hemipterus* on bats may prove to be of importance in the epidemiology of south american trypanosomiasis.

To my knowledge, this is the first case of *C. hemipterus* parasitizing a non-human host in the area south of Mexico to be reported.

Acknowledgements: I am very grateful to Dr. G. M. Kohls (R. M. L., Hamilton, Montana) for his help in checking the literature and to Dr. C. O. Handley (U. S. Nat. Mus., Washington, D. C.) for the identification of the bat species.

This investigation was partially supported by U. S. Army Grant DA-ARO-49-092-66-G 109.

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Van Den Berghe, L., M. Chardome, *and* **E. Peele.** 1963. An African bat trypanosome in *Stricticimex brevispinosus* Usinger, 1959. J. Protozool. 10: 135–138.

PALAEOSEPSIS SPECIES DESCRIBED BY MELANDER AND SPULER (DIPTERA: SEPSIDAE)

Three species described in the genus *Sepsis* by Melander and Spuler (1917) were placed by Duda (1926) in his subgenus *Palaeosepsis*, a taxon which I believe to be of generic rank. The Melander and Spuler type specimens are now in the United States National Museum collections. I have examined them with the following results. Full citations will appear in the pertinent part of the neotropical catalogue of Diptera, now in process of publication.

Palaeosepsis armillata (Melander and Spuler), 1917: 18, 81 (fig. 11, not 6). Curran (1928:75) claimed that Duda (1926:92) confused this species with *P. furcata* (M. and S.). Examination of the type specimens from "Hayti," one of which is hereby designated lectotype, shows that Duda's identification is correct and that Melander and Spuler evidently intermixed the captions for the figures of the two species.

P. furcata (M. and S.), 1917: 19, 81 (fig. 6, not 11). See above. One of the originally cited males is labelled as "type."

P. hoplicnema (M. and S.), 1917: 17, 81 (fig. 12). The unique male type shows that Duda's figure (1926: 107, fig. 77) is more accurate than that of the original description. The species, as stated by Duda, is quite certainly a synonym of *P. armata* (Schiner).

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A NEW ATELEUTE FROM THE UNITED STATES
(HYMENOPTERA, ICHNEUMONIDAE)

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The genus *Ateleute* Foerster is represented by many species in the warmer parts of the Old World, where it has been reared several times from Psychidae. It has not yet been reported from the Western Hemisphere. Mr. Peter Hättenschwiler, of Uster, Switzerland, on a visit to the United States in 1963, reared a specimen of this genus at Greenville, South Carolina from a psychid, along with some other parasites of Psychidae from several localities in the Carolinas.

Although *Ateleute* has not been reported previously from America, Mr. Hättenschwiler's is not the first specimen known. Some years ago, I saw two male specimens in the U. S. National Museum that were collected in south central United States. In 1965, Mr. John Schmid found a male of the genus among Malaise trap material from Golden Pond, Kentucky, collected by Dr. Sam Breeland. These three males may be the same species as the female described below, but males of *Ateleute* are difficult to associate with their females, as there is strong sexual dimorphism. The genus occurs also in South America. I have seen three undescribed species from Peru.

Ateleute is an isolated genus of the subfamily Gelinae. By "key characters" it belongs in the tribe Mesostenini, but the genus may be a derivative of the Chirotica group of genera in the Gelini, and thus may have independently developed mesostenine characters. For the present, I prefer to place it in the Mesostenini. It should be in a subtribe by itself: the Ateleutina.

The more distinctive characters of *Ateleute* are: Postpectal carina complete, not interrupted in front of each middle coxa; mesopleural fovea absent; areolet moderately large, about twice as wide as high, the second intercubitus weak or absent; second recurrent vein vertical, with one bulla; tergite 1 often longitudinally striate, its spiracle at the midlength; propodeum long, its apical transverse carina usually distinct, its basal transverse carina absent or indistinct, without distinct longitudinal carinae.

Ateleute carolina, n. sp.

Male: Unknown.

Female: Front wing 3.7 mm. long; postero-median part of mesoscutum with longitudinal wrinkles; apical transverse carina of propodeum distinct, the basal carina obsolete; propodeum in front of apical transverse carina mat and with weak transverse wrinkling; second intercubitus faint; tergite 1 weakly mat, medially subpolished, with a median longitudinal impression, without any longitudinal striae; tergite 2 weakly mat, without punctures or wrinkles; ovipositor sheath 0.6 as long as front wing.

Fulvous, with the head black. Clypeus, palpi, and propleurum not visible because glued next to card mount; mandible whitish; antenna black, the front half of scape ferruginous, apical 0.3 of flagellar segment 5, all of flagellar segments 6–9, and basal 0.6 of flagellar segment 10 white; pronotum fuscous, its front part, lower part, and hind corner white; mesonotum and metanotum black, the lateral lobe of mesoscutum margined with white mesally and anterolaterally, the median lobe of mesoscutum broadly margined with white anterolaterally; apex of scutellum white; subtegular ridge whitish; mesopleurum with a fuscous area beneath front wing; legs pale fulvous, their fifth tarsal segments infuscate.

Distinctive characters of this species are the lack of longitudinal striae on tergite 1, and the color pattern of the thorax.

Type ♀, Greenville, South Carolina, emerged from case of *Astala confederata* (Psychidae), Feb. 23, 1963, Peter Hättenschwiler (Townes).

NEW SYNONYMY IN PLERONEURA KONOW
(HYMENOPTERA: XYELIDAE)

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Ross (1932) revised the North American *Pleroneura* Konow and included 7 species. He stated that the species had been described from very few specimens and that larger series would be necessary in order to determine how stable the characters are on which these species were based. In recent years, several large series of *Pleroneura* have been collected in the East and West, and it is now possible to evaluate some of the characters which were previously used for species separation.

P. brunneicornis Rohwer and *P. borealis* Felt were both described from New York State and are the only described eastern forms. Ross separated these species from the western *Pleroneura* by the pale posterior margin of the pronotum and pale femora, then distinguished between them by veins r-m and m-cu of the fore wing being interstitial or not. In series of a species of *Pleroneura* collected in Maine, the position of veins r-m and m-cu of the fore wing was found to be variable; consequently, I consider these two species to be the same.

The western species of the group, in which the body is primarily black, were separated by the dark or light coloration of the tibiae, femora, and clypeus. Several series of a species of *Pleroneura* which were collected in Oregon and California show a high degree of color variation within and between sexes. In some instances, the associated males and females will key to different species in Ross' key. Therefore,

I believe that the 3 western species, *californica* Ashmead, *schwarzi* Rohwer, and *aldrichi* Ross, as recognized by Ross, are the same. The types of these species also fall within the range of variation which I have found.

The following synonymy is proposed:

Pleroneura brunneicornis Rohwer

Pleroneura bruneicornis (!) Rohwer, 1910, Can. Ent. 42: 89, ♀.
Pleroneura borealis Felt, 1917, Can. Ent. 49: 220, ♂, ♀. **New synonymy.**

Pleroneura californica (Ashmead)

Manoxyela californica Ashmead, 1898, Psyche 8: 214, ♀.
Pleroneura fulvicornis Rohwer, 1910, Can. Ent. 42: 89, ♂. Synonymy by Ross, 1951, confirmed.
Pleroneura schwarzi Rohwer, 1910, Can. Ent. 42: 220, ♀. **New synonymy.**
Pleroneura aldrichi Ross, 1932, Ann. Ent. Soc. Amer. 25: 158, ♂, ♀. **New synonymy.**

Two other western species, *koebelei* Rohwer and *lutea* Rohwer, were recognized by Ross, and they may be separated from *californica* by their predominately yellow coloration and genitalic characters. As yet, I have not seen additional specimens of these forms.

P. brunneicornis and *P. californica* may be separated by genitalic characters, and the larvae of *brunneicornis* also differ from larvae which may be *californica* taken from the twigs of fir.

The eastern *brunneicornis* has been reared from larvae boring in the twigs of fir, whereas *californica* is associated with fir only by adult collections and oviposition observations. The hosts and habits of *koebelei* and *lutea* are not known.

References

Ross, H. H. 1932. The Hymenopterous family Xyelidae in North America. Ann. Ent. Soc. Amer. 25: 153–169.

————. 1951. Xyelidae. *in* Muesbeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog. U. S. Dept. Agr., Agr. Monogr. 2: 5–7.

LECTOTYPE DESIGNATION FROM THREE SYNTYPES OF RADFORDIA SUBULIGER EWING

(Acarina: Myobiidae)

The need for the designation of a lectotype for the species *Radfordia subuliger* Ewing became apparent when it was found that Ewing (1938, Proc. Ent. Soc. Wash. 40: 180–197) did not designate a holotype for *R. subuliger* Ewing. The type material upon which Ewing based his new description has been studied by the author by the loan of the three syntypes deposited in the United States National Museum.

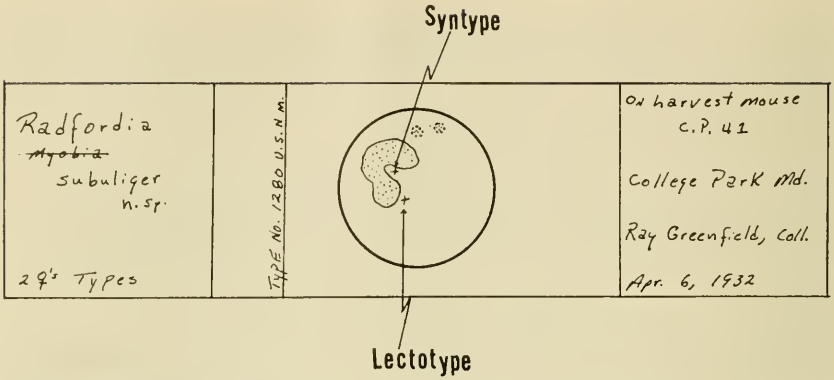

Fig. 1. *Radfordia subuliger* Ewing, female lectotype designation on type slide No. 1280 USNM.

Ewing (1938) described *R. subuliger* from two females which were mounted on a single slide, designated as Type No. 1280 USNM and from one female mounted on a separate slide with a label that read at the time of the description as *Myobia subuliger* n. sp. This slide is from a different host than that of the type slide and collected on a different date. Also this slide is in very poor condition.

The selection of the lectotype by the author has been made from the slide bearing the Type No. 1280. Due to the possible destruction of the type material and the slide labels, no attempt has been made to remount onto single slides these two syntypes. Indication to the lectotype is possible by the deterioration of the slide median. A drawing showing the location of the lectotype and syntype on the Type No. 1280 USNM is shown in fig. 1. This drawing has been attached to the back of the type slide. B. McDaniel, *Department of Entomology-Zoology, South Dakota State University, Brookings, South Dakota 57006.*

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A LIST OF THE SPECIES OF MACROSIPHONIELLA DEL GUERCIO DESCRIBED FROM NORTH AMERICA

(Homoptera: Aphididae)

Louise M. Russell, *Entomology Research Division, ARS, U.S. Department of Agriculture, Washington, D. C. 20250*

Twenty-one species assignable to *Macrosiphoniella* (*sensu lato*) have been described from North America, but only seven have been placed in this genus. In this paper, names of the 14 remaining species are associated with *Macrosiphoniella* to make new name com-

binations available. The 21 species are listed, and their original citations and previous name combinations are given. One North American species included in the genus because of a misidentification is discussed. Five species of *Macrosiphoniella* (*absinthii* (Linnaeus), *leucanthemi* (Ferrari), *millefolii* (De Geer), *tanacetaria* (Kaltenbach), and *trimaculata* Hille Ris Lambers) described from Europe also have been reported from North America.

The repository of type specimens is given when known. Additional types of some species presumably are present in other collections.

Macrosiphoniella Del Guercio 1911 is closely related to *Dactynotus* Rafinesque 1818. Indeed, Eastop in 1961 (A study of the Aphididae (Homoptera) of West Africa p. 19) included *atra* (Ferrari) 1872, the type-species of *Macrosiphoniella*, in *Dactynotus*. In 1966 (Austral. Jour. Zool. 14: 455) however, he recognized *Macrosiphoniella* as a valid genus. Takahashi and Moritsu (Mushi 37: 1, 1963) stated that *Macrosiphoniella* "can not be definitely separated from *Dactynotus* . . . but is here maintained as a valid genus, since the trend of the modification of the body structures is different from that of the latter genus." Although most species may readily be placed in one group or the other, border forms are difficult to assign. Future studies doubtless will show whether *Macrosiphoniella* should be considered of generic rank. The genus is now accepted by workers though perhaps without critical consideration of the reasons for doing so.

The salient characteristics of *Macrosiphoniella* are as follows: Last rostral segment slender, tapered, often stiletto-shaped with acute tip, with setae located on basal portion of segment longer than the 3 apical pairs (much longer if segment is stiletto-shaped). Cornicles reticulated at least near apex; nearly or actually flangeless; cylindrical, or enlarged basally and sometimes slightly so distally; slightly shorter than, to twice as long as, cauda; usually without, but sometimes with, a few setae. Frontal tubercles distinct, diverging. Setae on antennal segment III blunt or enlarged apically, usually not acute. Tergum membranous but scleroites often present around bases of setae; sclerites absent, or present anterior and/or posterior to the cornicles; 4 or more setae on tergum 8. Each 1st tarsal segment with 3 setae. Apterae with secondary sensoria on antennal segment III. Most species holocyclic on Anthemideae (Compositae).

Macrosiphoniella can be distinguished from *Dactynotus* by its tapered, often stiletto-shaped beak with the basal setae of the last rostral segment usually much longer than the apical ones; by its flangeless or almost flangeless cornicle; and by the presence of 3 setae on each 1st tarsal segment. None of these conditions pertain to *Dactynotus* except the last, where the 1st tarsal chaetotaxy may be 3 but more often is 4 or 5.

In the following list, M. after the species and author name refers to *Macrosiphoniella*.

albicornus (Knowlton and Allen) **M.**, n. comb.
Mucrotrichaphis albicornus Knowlton and Allen 1940, Ohio Jour. Sci. 40: 33.
Macrosiphum albicornum (Knowlton and Allen), Palmer 1952, Aphids of the Rocky Mountain Region p. 290.
Holotype—USNM.

anomellus (Knowlton and Allen) **M.**, n. comb.
Macrosiphum anomellus Knowlton and Allen 1938, Can. Ent. 70: 75.
Mucrotrichaphis anomellus (Knowlton and Allen), Knowlton and Allen 1940, Ohio Jour. Sci. 40: 34.
Cotypes—USNM.

artemisiae Cowen—see *coweni* Hunter.

artemisiphilus (Knowlton and Allen) **M.**, n. comb.
Macrosiphum artemisiphilus Knowlton and Allen 1938, Can. Ent. 70: 75.
Cotypes—USNM.

artemisivulgaris (Knowlton and Allen) **M.**
Macrosiphum artemisivulgaris Knowlton and Allen 1938, Can. Ent. 70: 76.
Macrosiphoniella artemisivulgaris (Knowlton and Allen), Quednau 1966, Can. Ent. 98: 428.
Cotypes—USNM.

cefsmithi (Knowlton and Allen) **M.**, n. comb.
Macrosiphum cefsmithi Knowlton and Allen 1938, Can. Ent. 70: 76.
Cotypes—USNM.

chrysanthemi Oestlund—see *sanborni* (Gillette).

chrysanthemicolens Williams—see *sanborni* (Gillette).

cinerescens Hille Ris Lambers, **M.**
Macrosiphoniella cinerescens Hille Ris Lambers 1966, Hilgardia 37: 588.
Holotype—Hille Ris Lambers colln.; paratypes—Univ. of California, Berkeley.

coweni (Hunter) **M.**, n. comb.
Nectarophora artemisiae Cowen *in* Gillette and Baker 1895, Colo. Agr. Expt. Sta. Bul. (Tech. Ser. 1) 31: 123 (preoccupied).
Nectarophora coweni Hunter 1901, new name, Iowa Agr. Expt. Sta. Bul. 60: 114.
Macrosiphum coweni (Hunter), Sanborn 1906, Kans. Univ. Sci. Bul. 3: 232; Gillette and Palmer 1934, Ent. Soc. Amer. Ann. 27: 175 (selected neotype and paraneotypes).
Neotype and paraneotypes—USNM.

essigi (Soliman) **M.**, n. comb.
Obtusicauda essigi Soliman 1927, Calif. Univ. Pubs. Ent. 4: 99.
Macrosiphum essigi (Soliman), Knowlton and Allen 1938, Can. Ent. 70: 78.
Dactynotus essigi (Soliman), Eastop 1961, A study of the Aphididae (Homoptera) of West Africa p. 19.
Cotypes—Univ. of California, Berkeley.

filifoliae (Gillette and Palmer) **M.**, n. comb.
Macrosiphum filifoliae Gillette and Palmer 1928, Ent. Soc. Amer. Ann. 21: 5.
Cotypes—USNM.

flavila (Knowlton and Allen) **M.**, n. comb.
Mucrotrichaphis flavila Knowlton and Allen 1940, Ohio Jour. Sci. 40: 35.
Macrosiphum flavilum (Knowlton and Allen), Palmer 1952, Aphids of the Rocky Mountain Region p. 306.
Cotypes—USNM.

frigidae (Oestlund) **M.**, n. comb.
Siphonophora frigidae Oestlund 1886, Minn. Geol. and Nat. Hist. Survey Ann. Rpt. 14: 20.
Nectarophora frigidae (Oestlund), Oestlund 1887, Minn. Geol. and Nat. Hist. Survey Bul. 4: 83.
Macrosiphum frigidae (Oestlund), Sanborn 1906, Kans. Univ. Sci. Bul. 3: 232.
Obtusicauda frigidae (Oestlund), Soliman 1927, Calif. Univ. Pubs. Ent. 4: 99.
Cotypes—Univ. of Minnesota, St. Paul.

frigidicola Gillette and Palmer, **M.**
Macrosiphoniella frigidicola Gillette and Palmer 1928, Ent. Soc. Amer. Ann. 21: 3.
Macrosiphum frigidicola (Gillette and Palmer), Gillette and Palmer 1934, Ent. Soc. Amer. Ann. 27: 180.
Cotypes—USNM.

glabrum (Gillette and Palmer), **M.**, n. comb.
Macrosiphum glabrum Gillette and Palmer 1928, Ent. Soc. Amer. Ann. 21: 2.
Cotypes—USNM.

jonesi (Gillette and Palmer) **M.**, n. comb.
Macrosiphum jonesii Gillette and Palmer 1928, Ent. Soc. Amer. Ann. 21: 7.
Cotypes—USNM.

ludovicianae (Oestlund) **M.**
Siphonophora ludovicianae Oestlund 1886, Minn. Geol. and Nat. Hist. Survey Ann. Rpt. 14: 23.
Nectarophora ludovicianae (Oestlund), Oestlund 1887, Minn. Geol. Nat. Hist. Survey Bul. 4: 80.
Macrosiphum ludovicianae (Oestlund), Sanborn 1906, Kans. Univ. Sci. Bul. 3: 232.
Tritogenaphis ludovicianae (Oestlund), Oestlund 1922, Minn. State Ent. Rpt. 19: 142.
Macrosiphoniella ludovicianae (Oestlund), Hille Ris Lambers 1931, Tijdschr. v. Ent. 74: 176.
Cotypes—Univ. of Minnesota, St. Paul.

pennsylvanica (Pepper) **M.**
Macrosiphum pennsylvanicum Pepper 1950, Fla. Ent. 33: 3.
Macrosiphoniella pennsylvanica (Pepper), Hille Ris Lambers 1966, Hilgardia 37: 588.
Holotype, allotype, paratypes—USNM; paratypes—Pepper colln.

sanborni (Gillette) **M.**
Siphonophora chrysanthemicolens Williams 1891, Univ. Nebr. Dept. Ent. Spec. Bul. 1: 8, *nomen nudum.*
Macrosiphum chrysanthemi (Oestlund), misidentification by Sanborn 1904, Kans. Univ. Sci. Bul. 3: 73.
Macrosiphum sanborni Gillette 1908, Can. Ent. 40: 65.

Siphonophora chrysanthemicolens Williams 1911 (1910), Nebr. Univ. Studies 10: 75, described.

Macrosiphoniella sanborni (Gillette), van der Goot 1917, Indian Mus. Records (Indian Sci. Jour.) 13: 183.

Pyrethromyzus sanborni (Gillette) Boerner 1952, Mitt. Thür. Bot. Ges. 3: 168.

Dactynotus (*Pyrethromyzus*) *sanborni* (Gillette), Eastop 1961, A study of the Aphididae (Homoptera) of West Africa p. 19.

Cotypes—USNM.

tapuskae (Hottes and Frison) **M.**

Macrosiphum tapuskae Hottes and Frison 1931, Ill. Nat. Hist. Survey Bul. 19: 327.

Macrosiphoniella tapuskae (Hottes and Frison), Hille Ris Lambers 1938, Temminckia 3: 37.

Holotype and paratypes—Illinois Nat. Hist. Survey, Urbana; paratypes—USNM.

toti (Knowlton and Allen) **M.**, n. comb.

Mucrotrichaphis toti Knowlton and Allen 1940, Ohio Jour. Sci. 40: 33; Palmer 1952, Aphids of the Rocky Mountain Region p. 332. Palmer synonymized *toti* with *Macrosiphum zerothermum* Knowlton and Allen. I do not accept this synonymy.

Holotype and paratypes—USNM.

zerohypsi (Knowlton and Allen) **M.**, n. comb.

Mucrotrichaphis zerohypsi Knowlton and Allen 1940, Ohio Jour. Sci. 40: 34.

Macrosiphum zerohypsi (Knowlton and Allen), Palmer 1952, Aphids of the Rocky Mountain Region p. 332.

Cotypes—USNM.

zerothermus (Knowlton and Allen) **M.**, n. comb.

Macrosiphum zerothermus Knowlton and Allen 1938, Can. Ent. 70: 83.

Cotypes—USNM.

Macrosiphoniella eupatorii (Williams) of Leonard 1963 is a misidentification because, though the identity of *eupatorii* is uncertain, the insects do not agree with the description of this species. The specimens ("sweeps" taken in 1946) reported as *eupatorii* by Leonard are *Microparsus desmodiorum* Smith and Tuatay.

Williams' *eupatorii* has been recorded as follows:

Siphonophora eupatoris Williams 1891, Nebr. Univ. Dept. Ent. Spec. Bul. 1: 26, *nomen nudum*.

Macrosiphum eupatorii (Williams), Sanborn, 1906, Kans. Univ. Bul. 3: 237–238, *nomen nudum*.

Siphonophora eupatorii Williams 1911 (1910), Nebr. Univ. Studies 10: 77, described.

Macrosiphum eupatorii (Williams), Davis 1911, Nebr. Univ. Studies 11: 281 (Reprint Nebr. Univ. Dept. Ent. Contrib. 5: 29).

Macrosiphoniella eupatorii (Williams), Leonard 1963, Kans. Ent. Soc. Jour. 36: 73.

Following his description of *cupatorii*, Williams stated,

"On white snakeroot (*Eupatorium ageratoides*), in company with *Aphis ageratoides* Oestlund, October, 1889. Apterous females and

pupae of a *Siphonophora* very close to, if not identical with the above, were collected September, 1890, on *Eupatorium perfoliatum* at Ashland not far from the place where that species was collected, differing only in being of a more uniformly greenish-brown color and having the tail concolorous with the body. Length of body, 1.75–2.00 mm.; antennae, 2.90 mm.; honey tubes 0.40 mm. The species has affinities with *Myzus*."

Williams' 1911 paper was published 11 years after his death, and its introduction as well as other brief portions were prepared by some other person. Regarding *cupatorii*, it is stated (pp. 6, 78) that there were no specimens in the University of Nebraska or the U. S. National Museum collections. And Davis, after including *cupatorii* in *Macrosiphum*, stated, "I have had no opportunity of studying this species since the types are lost."

There apparently are no specimens of the *cupatorii* described from *Eupatorium ageratoides*, October 1889, and only these can be considered types of this species. However, two slides bearing apterous adults and nymphs collected from *E. perfoliatum* at Ashland, September 1890, are in the U. S. National Museum. These specimens are *Microparsus desmodiorum* Smith and Tuatay. It is evident that they are a different species than those described from *E. ageratoides* because specimens from the latter host are said to have both the cornicles and the cauda black, with the cornicles twice as long as the cauda. In the specimens from *E. perfoliatum* the cornicles are black and the cauda pale, and the cornicles are slightly longer than the cauda.

Thus *Siphonophora cupatorii* Williams 1911, will remain a *nomen dubium* unless type specimens of the species are found. I have not been able to locate them in the collection of the U. S. National Museum. It is possible that *cupatorii* belongs in *Macrosiphoniella* or *Dactynotus*, for the cauda is concolorous with the dark cornicles in several species of these genera, and in some species of each genus the cornicles are approximately twice as long as the cauda. A *Microparsus* with a black cauda is not known at present though this does not preclude the existence of such a species.

A *Microparsus* from *Eupatorium* (Compositae) would be of interest because species of this genus have been known with certainty only from *Desmodium* (Leguminosae). It seems questionable whether Williams would have confused *Eupatorium ageratoides* and *E. perfoliatum* with *Desmodium*, however, for he also described *Siphonophora desmodii* from *Desmodium canescens*. *S. desmodii* Williams 1911, whose types are in the USNM, was first described as *Microparsus variabilis* Patch 1909.

SOPHY I. PARFIN

1918–1966

Photo taken in January 1947

Sophy I. Parfin was born in New Haven, Connecticut, April 22, 1918, and died in New Britain, Connecticut, October 28, 1966. She had retired on disability September 15, 1960, from the Smithsonian Institution, Washington, D. C., where she was an entomologist on the staff of the U. S. National Museum, working on the systematics of Neuroptera and related insects. It is particularly tragic that her health failed at such an early age, before the full potential of a scientific career to which she was deeply devoted could be realized.

Her parents, John Parfinowich and Anastia Hamego, were born in Russia; her mother died in 1919. Sophy preferred the shorter surname Parfin, and in 1950 obtained official court permission for the change. She seldom used her full middle name, Ivanovna, which by Russian custom means "daughter of John".

Following graduation from Meriden High School, she attended Bethel Junior College, St. Paul, Minnesota (1935–37), and was the Salutatorian of her class. She then attended Wheaton College, Wheaton, Illinois, where she received honors and the B. S. degree in 1939, with a major in zoology. She spent an additional academic year at Wheaton taking education courses and obtaining a teacher's certificate. At both Bethel and Wheaton she studied Bible extensively. German and zoology, the latter including one course in entomology, were strongly represented at Wheaton. Sophy's record shows a dedicated

interest in advancing her education. In New Jersey during 1943 she attended night classes, especially in English, at the Newark College of Engineering. Later, during her Washington, D. C. residence, she studied medical entomology and Russian at the U. S. Department of Agriculture Graduate School (1944); morphology, ecology, and physiology of insects at the University of Maryland (1946–47); mycology at George Washington University (1946–47). During her employment at the Smithsonian Institution, she took an unpaid leave of absence to study entomology at the University of Minnesota (July 1, 1947–June 30, 1949); the original 1-year leave was followed by 3 shorter extensions. Her studies at Minnesota led to an M. S. degree, also to her 1952 paper on the Megaloptera and Neuroptera of Minnesota.

She was active in extra-curricula activities in college. She was a member of the glee club, and also played the violin, mandolin, and piano. On the rifle team she won medals as a sharpshooter; one year she was college table tennis champion. She was a good tennis player and swimmer, and was active in both sports after college. In Washington she was chairman of the sports committee, American Association of University Women. Miss Parfin took pride as a woman in scientific work, and became secretary of the Washington Chapter of Sigma Delta Epsilon, a professional society of women scientists. She was also a member of the Entomological Society of Washington. Following her retirement, she was a member of the Calvary Baptist Church of Meriden.

During parts of 1940–42 Miss Parfin was a substitute teacher in Connecticut high schools, especially Meriden High School, by day, and worked nights at the New Departure Manufacturing Co. In September–November 1941 she taught biology and mathematics in high school at Orono, Maine. In 1942 she began work as an assistant mechanical engineer at the Western Electric Co., Kearney, N. J., where she assembled and inspected ball-bearing components; she also instructed new employees. The work at Western Electric was considered important to the war effort (World War II), and she had to obtain special permission from the War Manpower Commission to leave there and to join the staff of the Smithsonian Institution. At that time the Smithsonian had many demands for the handling and identification of mosquitoes and other insects of medical importance from overseas and domestic sources. Miss Parfin began Smithsonian employment as a Scientific Aid in the Division of Insects, U. S. National Museum, on January 17, 1944, under a War Service Appointment. With the exception of two years at the University of Minnesota, she remained at the Smithsonian until her retirement, advancing through the ranks of Preparator and Junior Entomologist to Assistant Curator.

At the Smithsonian Institution, Miss Parfin made identifications and provided consultation in several orders of Neuropteroid insects, expecially the Neuroptera, and curated them in the small but growing collection. She took an avid interest in research, and it was her nature to inquire into all details of a problem insofar as information was available. Because of her limited prior experience in the technicalities of Neuroptera systematics, and the time required for service responsibilities, completion of manuscripts was necessarily slow; a list of her publications follows. The most important paper is that on Sisyridae, small brown lacewinged Neuroptera which as larvae are parasitic on freshwater sponges. Most of her available research time for two years or more was given to the preparation of this paper.

At least two years before Miss Parfin's retirement, her health became affected by arthritis and associated disease. It became increasingly difficult for her to continue the physical requirements of handling museum drawers, making her usual painstaking dissections, and the like. Her associates and other friends were distressed by the burdens which detracted from her previous glad-hearted and enthusiastic personality. In the six years of her retirement, during which she lived with her father and her devoted step-mother, her health continually worsened from the onslaught of arthritis and its complications.

In closing this biographical account of a lamented colleague whose life and career were interrupted just as the fully productive years were approaching, we pay further tribute to her high standards of scholarship, ideals of research achievement, and dedicated interest in entomology. To her father, step-mother, and sister we extend warmest sympathy.

ASHLEY B. GURNEY *and* LUELLA M. WALKLEY

Entomological Publications of Sophy I. Parfin

1947. [Untitled note on Mecoptera from Oregon] Note given at May 1, meeting. Proc. Ent. Soc. Wash. 49: 258.

1952. The Megaloptera and Neuroptera of Minnesota. Amer. Midl. Naturalist 47: 421–434.

1955. Additional records for *Brachypanorpa carolinensis* (Banks) (Mecoptera, Panorpidae). Proc. Ent. Soc. Wash. 57: 204–205.

1956. Taxonomic notes on *Kimminsia* (Neuroptera; Hemerobiidae). Proc. Ent. Soc. Wash. 58: 203–209, 15 figs.

1956. The spongilla-flies, with special reference to those of the Western Hemisphere (Sisyridae, Neuroptera). Proc. U. S. Nat. Mus. 105: 421–529, 24 figs., 3 pls. (By Sophy I. Parfin and Ashley B. Gurney)

1958. Notes on the bionomics of the Mantispidae (Neuroptera: Planipennia). Ent. News 69: 203–207.

1959. Chapter 37, Neuroptera, pp. 973–980, 4 figs., *in* Freshwater Biology, Edited by W. T. Edmondson, 1248 pp. (By Ashley B. Gurney and Sophy I. Parfin)

BOOK REVIEWS

Systems Analysis in Ecology, edited by Kenneth E. F. Watt. Academic Press, New York, N.Y. xiii + 276 pp., illus. January, 1967. $11.50.

Designed to survey problems and techniques of systems analysis in ecology, this is the first book to present new electronic and computer procedures being used in ecology and resource management. Professor Watt has brought together a fascinating array of papers that discuss the motives for using systems analysis in ecology, the electronic principles used in data acquisition systems, instrumented universes for studying animal behavior, the design of systems experiments, systems simulation, statistical aspects of data reduction by the use of computers, and a host of additional items applicable to computer usage in this complicated field of biology. The book will appeal especially to those ecologists whose respect for the modern-day computer reaches beyond its ability simply to reduce data. As aptly expressed by one of the contributors, Crawford S. Holling, ". . . if biology has told us anything, it is that complex systems are not simply the sum of their parts. There is an emergent principal when fragments act and interact in a whole system. The speed and large memory of modern digital computers for the first time allows the ecologist, in principle, to incorporate all the relevant actions and interactions of the fragments of complex ecological systems in an integrated manner." One of the greatest values of this book might well be to show ecologists how they can take advantage of a very powerful tool in investigations now under way or in the planning stage.—Richard H. Foote, *Entomology Research Division, ARS, U.S. Department of Agriculture, Washington, D.C. 20560.*

Insektenstimmen. By S. L. Tuxen. 156 pp., 89 figs. 1967. Publisher: Springer-Verlag (Berlin, Heidelberg, New York). Price: DM 12.80 ($3.20).

Man's interest in sounds produced by insects is very old, but in recent years, especially since the appearance of a 1949 book "The songs of insects" by George Pierce, a Harvard physics professor, refined modern equipment has permitted the "songs" to be recorded, analyzed, and described to others in a way that was not available to Scudder, Allard, and other early observers. Consequently, there have been many advances which have placed the study of insect sounds on a thorough scientific basis, at the same time demonstrating how a knowledge of this aspect of behavior may contribute to systematics, ecology, and applied phases of entomology. The present book, the title of which would be "Insect sounds" in English, first appeared in Danish in 1964 and now is issued as the 88th in a series of small, handbook-size volumes on natural history published in German by Springer-Verlag. It is attractive, well printed on good paper, and sturdily bound. Dr. S. L. Tuxen is an entomologist of broad interests, best known professionally as a specialist of Protura, for editing a 1956 volume on insect genitalia, and for heading the Department of Entomology in the Zoological Museum in Copenhagen. In private life Dr. Tuxen is a gifted musician, an enthusiastic raconteur of observations in many foreign lands, and a charming host.

The book is divided into sections or small chapters, the titles of which trans-

late as follows, with a few explanatory words by this reviewer in parentheses: Do insects sing? A musician and his instrument; Song of the cricket, a little sound-theory; Song and mating of the cricket; Ranges and territories of crickets; Song of the tree grasshoppers (Tettigoniidae); A field grasshopper woos; A brief summary; The ear of the grasshopper; A little acoustics and a little electrophysiology; Direction hearing; Singing and hearing; The "near the knee" organ (tympanal organs); Hearing hairs and flight reaction; A little singing brain; Unorthodox grasshopper voices; Other stridulating insects; Underwater singers; Ghost tappers (death-watch, etc.); The happy cicadas; The deathshead moth and the sounds in the beehive; What does a male midge hear?; Moth and bat; Why do insects sing? The origin of songs, some theories.

The 1961 book, "Insect sounds," by Peter T. Haskell, is a somewhat more formal, near counterpart in English. Though Dr. Tuxen contributes some observations of his own, the book is mainly a summary of work by other entomologists, and the experiments and illustrations of Richard D. Alexander, Busnel, Haskell, Regen, Roeder, Treat, T. J. Walker and others have been drawn upon freely. The bibliography is quite short, the bulk of the literature having been assembled in 1960 by Hubert and Mabel Frings. The illustrations, of which about 10 are original, do much to make the book attractive and to clarify the text. For instance, fig. 27 shows Regen's clever method of placing crickets in cages suspended from small free-flying balloons in order to demonstrate that hearing occurred and was not due to any vibrations through a solid substrate.

For those persons with an interest in insects or general natural history, and who read German, this seems like an extremely pleasant and informative book. For serious students it provides a very readable, relatively non-technical summary of the highlights of recent contributions on insect sounds and their meaning. For graduate students studying German, the book might be useful as a practice reader. ASHLEY B. GURNEY, *Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D.C. 20560.*

BOOK NOTICE

Clarification of the status of the type specimens of Diabroticites (Coleoptera, Chrysomelidae, Galerucinae). By Ray F. Smith and John F. Lawrence. Univ. Cal. Pubs. Ento., vol. 45: 1–168, 4 pls., 1967. This work is a guide to the location of the type specimens of the over 900 valid species of this group and provides a nomenclatural base for future work. The *Diabroticites* is about equal to the content of the genus *Diabrotica* prior to 1947.

SOCIETY MEETINGS

750th Regular Meeting—March 2, 1967

The 750th regular meeting of the Society was called to order by the president, Mr. Louis G. Davis, on March 2, 1967 at 8:00 p.m. in room 43, U. S. National Museum. Thirty-one members and twenty-seven guests were in attendance. Minutes of the previous meeting were approved as read. The names of *Richard H. Whitsel, Cheng Shan Lin, Ralph E. Webb,* and *Gerald I. Stage* were read for the first time as candidates for membership in the Society. *J. Phillip Keathley* and *Gerald G. Elgert* were received into the Society.

R. H. Foote announced that the annual joint meeting with the Insecticide Society of Washington will be held on June 1 at the University of Maryland. L. G. Davis reported that Ralph W. Sherman, a member of our Society, was presented a distinguished service award by Kansas State University on January 30, 1967. K. V. Krombein exhibited a portion of a collection of over 89,000 insects from Ireland (mostly Hymenoptera) which had been donated to the U. S. National Museum by Mr. A. W. Stelfox. R. H. Foote reviewed and exhibited a new book, "Trap-nesting Wasps and Bees: Life Histories, Nests, and Associates", by K. V. Krombein and published by the Smithsonian Press. G. G. Elgert exhibited a photograph which he had taken of an earwig, *Anisolabis maritima* (Géné), guarding its eggs. L. G. Davis displayed several new pamphlets published by the Plant Pest Control Division, USDA dealing with insects which do not occur in the United States.

The speaker for the evening, Dr. Botha de Meillon, presented a most interesting and informative review of the entomology of malaria in Africa south of the Sahara. A lively discussion followed.

Following the introduction of visitors, the meeting was adjourned by President Davis at 9:30 p.m. RALPH A. BRAM, *Recording Secretary.*

751st Regular Meeting—April 6, 1967

The 751st regular meeting of the Society was called to order by the President, Mr. Louis G. Davis, on April 6, 1967 at 8:00 p.m. in room 43, U. S. National Museum. Thirty-eight members and twenty visitors were in attendance. Minutes of the previous meeting were approved as read. *Richard H. Whitsel, Chen Shan Lin, Ralph E. Webb,* and *Gerald I. Stage* were received into the Society.

Mrs. Helen Sollers-Riedel discussed the activities of the Teen International Entomology Group, an organization sponsored by Cornell University. R. I. Sailer reviewed and exhibited a recent book, "A Monograph of the Emesinae (Reduviidae, Hemiptera)", by P. W. Wygodzinsky and published as volume 133 of the Bulletin of the American Museum of Natural History, 1966.

The first speaker of the evening, Dr. Ashley B. Gurney, related his experiences collecting insects in Ethiopia, and discussed the activities of some of the entomologists working there. Dr. Oliver S. Flint reviewed his recent collecting expedition along the Antarctic. Impressive slide series accompanied each lecture.

Following the introduction of visitors, the meeting was adjourned by President Davis at 9:50 p.m. RALPH A. BRAM, *Recording Secretary.*

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> Muesebeck, C. F. W. 1963. Host relationships of the Euphorini (Hymenoptera: Braconidae). Proc. Ent. Soc. Wash. 65(4): 306.
>
> ———— and L. M. Walkley. 1951. *in* Muesebeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. Dept. Agr., Agr. Monogr. 2: 90–184.

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THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

ORGANIZED MARCH 12, 1884

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MEETINGS.—Regular meetings of the Society are held in Room 43 of the U.S. National Museum on the Thursday of each month from October to June, inclusive, at 8 P.M. Minutes of meetings are published regul in the *Proceedings*.

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PROCEEDINGS OF THE

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Vol. 69 SEPTEMBER 1967 No. 3

A SYNOPTIC CATALOG OF THE MOSQUITOES OF THE WORLD, SUPPLEMENT III

(DIPTERA: CULICIDAE)[1]

ALAN STONE, *Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D. C. 20560*

This paper is the third supplement to the *Synoptic Catalog of the Mosquitoes of the World* by Stone, Knight, and Starcke (1959), the second supplement having appeared in Vol. 65 (1963), No. 2, pp. 117–140 of the *Proceedings*. The introductory remarks as to format and coverage in Supplement II apply to this supplement also. One new name of the genus-group and 104 new names of the species group are listed. I am particularly indebted to T. H. G. Aitken, M. Delfinado, B. de Meillon, J. C. Hitchcock, Jr., C. L. Hogue, Z. Liepa, J. P. Macnamara, P. F. Mattingly, J. A. Reid, J. E. Scanlon, H. Sollers-Riedel, and T. J. Zavortink for pertinent information.

Introduction

Page

1. With the additions in this supplement and taxonomic changes, the number of valid genera and subgenera stands at 119, the number of valid species becomes 2,680, and the total number of names of the species-group 4,319.

Systematic Arrangement

6. The genus *Mansonia* (see p. 101) has been restricted to the two subgenera *Mansonia* and *Mansonioides*, and *Coquillettidia* raised to generic rank with *Rhynchotaenia* as a subgenus of it. *Kompia* has been restored to subgeneric status in the genus *Aedes*.

Catalog of the Family Culicidae

9. **Taxonomic Anatomy.**—1963b, Reid, 32-38 (pupal trumpet).
General Taxonomy.—1966, Dodge, 337-393 (1st stage larvae).
Australasian Region.—1966, Steffan, 179-237 (checklist, Papuan subregion).
Nearctic Region.—1963, Dodge, 796-813 (larvae; eastern North America).
Neotropical Region.—1961, Fauran, 2-60 (catalog, French Guiana); 1962, García and Ronderos, 105-212 (Anophelini, Argentina).
Oriental Region.—1966, Delfinado, 1-252 (Culicini, Philippines).

[1] Reprints are for sale by the Thomas Say Foundation, Entomological Society of America, 4603 Calvert Road, College Park, Maryland 20740.

Genus BIRONELLA Theobald
Subgenus BIRONELLA Theobald

10. **bironelli** (Christophers).—Transfer to p. 11 as synonym of *gracilis* Theobald.

gracilis Theobald.—Transfer to p. 11 as valid name.

11. **confusa** Bonne-Wepster.—Slooff, 1963, 138 (♂*, ♀, P*, L*).

gracilis (Theobald).—I.C.Z.N., 1965, 164 (Validation under Plenary Powers).

bironelli (Christophers), ibid. (Placed on list of rejected and invalid specific names).

Genus ANOPHELES Meigen

Important references: 1962, Service, 120-158 (W. Africa, keys); 1963, Quy, 26-34 (keys, Vietnam); 1963, various authors *in* Russell, West, Manwell, and MacDonald, 641-701 (keys).

Subgenus ANOPHELES Meigen

13. *Important reference:* 1965, Reid, 106-125 (key, *aitkenii* group).

acaci Baisas.—Philippines, Borneo. Reid, 1965, 115 (L*; syn.).

borneensis McArthur.

aitkenii James.—Philippines. Reid, 1965, 107 (♂*, ♀, P, L*, E; syn.).

pallida Ludlow.

fragilis Theobald.—Transfer to p. 18 as valid species.

ssp. **treacherii** Leicester.—Transfer to p. 18 as synonym of *fragilis* Theobald.

ssp. **bengalensis** Puri.—Change volume number from 18 to 17; transfer to p. 16 as valid species.

14. *pallida* Ludlow.—Transfer to p. 13 as synonym of *aitkenii* s. str.

var. **borneensis** MacArthur.—Transfer to p. 13 as synonym of *acaci* Baisas.

ssp. **stantoni** Puri.—Transfer to p. 18 as synonym of *fragilis* Theobald; change BM to NE.

var. **djajasanensis** (Brug).—Change to *djajasanensis* (Brug). See Reid reference under ssp. *interruptus* (syn.).

ssp. **interruptus** Puri.—Malaya. Reid, 1963a, 111 (taxonomy); change ssp. to var.

annulipalpis Lynch Arribálzaga.—García and Casal, 1964 (1965). Rev. Soc. ent. Argentina 27: 5 (P*).

15. **asiaticus** (Leicester).—Delete parentheses; insert as original citation "1903, J. trop. Med. 6: 291 (A); delete *Lophoscelomyia*.

16. **bengalensis** Puri.—Pakistan (Bengal), India (Assam), Burma, Thailand, Indo China, Philippines, S. China, Taiwan. Reid, 1965, 113 (♂*, ♀, P*, L*; to sp. status).

brevipalpus Roper.—Change "Moluccas" to "Bangka Island."

petragnani Del Vecchio.—Transfer to p. 25 as valid species; insert "; as var." after "E*,"

missiroli Del Vecchio.—Insert "; as var." after "E*".

17. **collessi** Reid.—Malaya, Borneo.

1963a. Ann. trop. Med. Parasit. 57: 103 (♂*, ♀*, P, L*, E*). Type-loc: Ulu Gombak near Kuala Lumpur, Selangor, Malaya (BM).

var. **ziemanni** Grünberg.—Insert "; as sp." after "♀."

18. **fragilis** Theobald.—Malaya, Indonesia e. to Celebes and Borneo, Philippines. Reid, 1965, 109 (♂*, ♀, P*, L*; syn.).
treacherii Leicester.
stantoni Puri.
19. var. **formosus** Ludlow.—Insert "; as sp." after "♀."
var. **simlensis** (James).—Insert "; as sp." after "*Patagiamyia*."
var. **oedjalikalahensis** Nainggolan.—Change to **oedjalikalah**; insert in Bonne-Wepster and Swellengrebel after "L*," "; as *oedjalikalahensis*."
var. **udjalikalah** Waktoedi.—Delete, merely a variant spelling of above.
20. **insulaeforum** (Swellengrebel and Swellengrebel de Graaf).—Burma, Thailand, Taiwan. Delete "? Japan, ? New Guinea, ? Australia." Reid, 1965, 119 (♂*, ♀, P*, L*).
21. **lesteri** Baisas and Hu.—Japan, China.
letifer Sandosham.—Thailand.
22. ssp. **japonicus** Yamada.—Insert "; as sp." after "♀*" in first line.
24. **noniae** Reid.—Malaya.
1963a. Ann. trop. Med. Parasit. 57: 108 (♂, ♀*, P*, L*). Type-loc: Ulu Langat, Selangor, Malaya (BM).
pursati Laveran.—Transfer to p. 27 as valid sp.
palmatus Rodenwaldt.—Delete "?" before Malaya. Reid, 1965, 117 (L*).
25. **petragnani** Del Vecchio.—Mediterranean Region. Coluzzi, 1962, 1025 (resurrected from synonymy).
26. ssp. **franciscanus** McCracken.—Change "SU" to "LACM".
willardi Vargas.—Delete "Ciudad Juárez."
27. *stonei* Vargas.—Insert "and USNM" after "ISET."
annulimanus Van der Wulp.—Change "North America" to "Wisconsin."
pursati Laveran.—Indochina, Thailand, Malaya. Reid, 1963a, 98 (♂*, ♀*, P*, L*; resurrected from synonymy).
28. **roperi** Reid.—Assam.
29. **sintonoides** Ho.—Malaya, Thailand.
stricklandi Reid.—Malaya.
1965. Ann. trop. Med. Parasit. 59: 121 (♂*, ♀, P*, L*). Type-loc: Johore, Malaya (BM).
tasmaniensis Dobrotworsky.—Tasmania, Australia.
1966. Proc. Linn. Soc. N.S.W. 91: 130 (♂*, ♀*, P*, L*, E*). Type-loc: Birralee, Tasmania (CSIR).
tibiamaculatus (Neiva).—Argentina.
tigertti Scanlon and Peyton.—Thailand.
1967. Proc. ent. Soc. Wash. 69: 19 (♂*, ♀, P*, L*). Type-loc: Ban Bu Phram, Prachinburi Province, Thailand (USNM).
30. **whartoni** Reid.—Malaya.
1963a. Ann. trop. Med. Parasit. 57: 106 (♂, ♀*, P, L, E). Type-loc: Singgora, Maran, Pahang, Malaya (BM).

Subgenus NYSSORHYNCHUS Blanchard

albitarsis Lynch Arribálzaga.—García and Casal, 1964 (1965). Rev. Soc. ent. Argentina 27: 6 (P*).

Subgenus KERTESZIA Theobald

35. **bambusicolus** Komp.—Change to **bambusicola.**
36. *hylephilus* Dyar and Knab.—Delete "Manoa, Orinoco River, Venezuela; Guayaquil, Ecuador and." Belkin, Schick and Heinemann, 1965, 44 (lectotype).

Subgenus CELLIA Theobald

38. **apoci** Marsh.—Arab, 1963, 73 (P*).
39. **brohieri** Edwards.—Transfer, with synonym, to p. 44 as variety of *hancocki* Edwards.
40. **cavernicolus** Abonnenc.—Change to **cavernicola.**
41. **cydippis** De Meillon.—Lips, 1962, 108 (to sp. status).
punjabensis James.—Insert "; as var." after "*Myzomyia.*"
melanocosta Newstead and Carter.—Insert "; as var." after *Pyretophorus.*"
domicolus Edwards.—Change to **domicola**; transfer to p. 46 as variety of *longipalpis* (Theobald).
wardi Leeson and Theodor.—Insert "; as var." after "L*."
42. **errabundus** (Swellengrebel).—Transfer to p. 32 as synonym of *darlingi* Root. Reid and Bonne-Wepster, 1966, 190 (suppression proposed).
43. *subumbrosa* Theobald.—Change to *subumbrosus*, delete *Myzomyia*, and change reference to Mem. Lpool Sch. trop. Med. 10 (App.): 4.
gambiae Giles.—Coluzzi, 1964, 197-232 (taxonomy).
merus Dönitz.—Transfer to p. 48 as valid species.
litoralis Halcrow.—Transfer to p. 48 as synonym of *merus* Dönitz.
44. var. **melas** (Theobald).—Delete *Pyretophorus* and parentheses around Theobald. Change reference to Mem. Lpool Sch. trop. Med. 10(App.): 2. Place Bathurst in [ ]. Transfer to p. 48 as valid species.
grenieri Grjebine.—Madagascar.
1964. Bull. Soc. Path. exot. 57: 38 (L*). Type-loc: Ampandroatraka, Anosibé Distr., Madagascar (IRSM).
hancocki Edwards.
var. **brohieri** Edwards.—Adam, Hamon, Rickenbach and Lips, 1956, 756 (to var. status).
45. **indefinitus** (Ludlow).—Malaya, Philippines, Indochina, China, Taiwan, Mariana Islands. Reid, 1966, 327 (to sp. status; syn.).
malayensis Hacker.
jamesii Theobald.—Malaya.
46. **longipalpis** (Theobald).
var. **domicola** Edwards.—Adam, Bruce-Chwatt, and Hamon, 1956, 107 (to var. status).
47. ssp. **willmori** (James).—Change to **willmorei**, here emended.
48. var. **pitchfordi** (Giles).—Insert "; as ssp." after "*Pyretophorus.*"
melas (Theobald).—Coluzzi, 1964, 275 (to sp. status).
merus Dönitz.—Coluzzi, 1964, 225 (to sp. status; syn.).
litoralis Halcrow.
tangensis Kuhlow, 1962, Ztschr. f. Tropenmed. u. Parasit. 13: 448 (♂, ♀). Type-loc: Tanga, Tanganyika (BNI).
49. ssp. **flavirostris** (Ludlow).—Delete "f." after "*Myzomyia*" and insert "; as sp."

52. ssp. **rupicolus** Lewis.—Change to **rupicola**.
55. var. **indefinitus** (Ludlow).—Transfer to p. 45 as valid species with var. *malayensis* Hacker as synonym.
var. **cydippis** De Meillon.—Transfer with synonym to p. 41 as valid species.
subpictus Grassi.
var. **vadakadiensis** Doraisamy.—India.
1963. Bull. Ent. (Madras) 4: 42 (L*). Type-loc: Near Vadakadu, Rameswaram Island, Madras, India (MSI).
56. **swahilicus** Gillies.—Kenya, Tanzania.
1964. Proc. R. ent. Soc. Lond. (B) 33: 67 (♂*, ♀*, P, L*). Type-loc: Goshi, Molindi Distr., Kenya (BM).
var. **orientalis** Swellengrebel and Swellengrebel de Graaf.—Insert "*Neomyzomyia*" before "*punctulata*."
57. **theobaldi** Giles.—Change original reference to "1901. Ent. mon. Mag. 37: 198."
58. **varuna** Iyengar.—Change IM to LU.

Genus TOXORHYNCHITES Theobald

59. *Important reference:* 1962, Lima, Guitton, and Ferreira, 225-252 (*Ankylorhynchus* and *Lynchiella*, revision, key).

Subgenus ANKYLORHYNCHUS Lutz

catharinensis (Lima, Guitton, and Ferreira).—Brazil.
1962. Mem. Inst. Osw. Cruz 60: 230 (♂*, ♀, P*, L*; *Ankylorhynchus*). Type-loc: Not given, but probably Santa Catarina, Brazil (IOC).

Subgenus LYNCHIELLA Lahille

bambusicolus (Lutz and Neiva).—Change to **bambusicola**.
mara Anduze.—Lima, Guitton, and Ferreira 1962, 243 (syn. suggested).
guianensis Bonne-Wepster and Bonne.—Insert "; as ssp." after "*Megarhinus*."
60. ssp. **septentrionalis** (Dyar and Knab).—Dodge, 1964, 46-53 (L*).
61. *mara* Anduze.—Transfer to p. 59 as synonym of *bambusicola*.

Subgenus TOXORHYNCHITES Theobald

62. **aurifluus** (Edwards).—Lien, 1965, 9 (♂*, ♀*, P*, L*).
ssp. **conradti** Grünberg.—Corbet, 1963, 9 (L*, P*, E).
63. **kaimosi** (Someren).—Corbet, 1963, 11 (P*).
64. **manicatus** (Edwards).—Lien, 1965, 2 (♂*, ♀*, P*, L*).

Genus TRIPTEROIDES Giles

65. *Important reference:* 1963b, Peters, 89-100 (New Guinea, key P).

Subgenus TRIPTEROIDES Giles

68. **elegans** Brug.—Peters, 1963b, 89 (P*, L*).
lorengaui Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 67 (♂*, ♀, P*, L*). Type-loc: Lorengau River, Manus Island, New Guinea (CSIR).

69. **nissanensis** Lee.—Peters, 1963a, 70 (P*).
novohanoverae Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 63 (♂*, ♀, P*, L*). Type-loc: Noipuas, New Hanover, New Guinea (CSIR).
71. **szechwanensis** Hsu.—China.
1964. Acta ent. Sinica 13: 298 (♂*, L*). Type-loc: Chengtu, Szechwan, China (SMC).

Subgenus RACHIONOTOMYIA Theobald

72. **marksae** Dobrotworsky.—Australia.
1965. Mosq. of Victoria :58 (♂*, ♀, L*). Type-loc: Cabbage Tree Creek, Victoria, Australia (NMM).
perplexus Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 91 (♀, P*). Type-loc: Maprik, Sepik District, New Guinea (CSIR).

Genus TRICHOPROSOPON Theobald
Subgenus TRICHOPROSOPON Theobald

73. var. **mogilasium** (Dyar and Knab).—Insert "; as sp." after "*Joblotia.*"
74-77. Running Heads. Change "TRICHOPOSOPON" to "TRICHOPROSOPON."

Subgenus SHANNONIANA Lane and Cerqueira

74. **fluviatilis** (Theobald).—Change to **fluviatile.**

Subgenus RUNCHOMYIA Theobald

76. **cotopaxensis** Levi Castillo.—Change to **cotopaxense.**
edwardsianum Lane and Cerqueira.—Cerqueira, 1961, 460 (♂*, ♀, P*, L*).
77. **lunatum** (Theobald).—Delete "Argentina."
paranensis Brèthes.—Argentina. García and Casal, 1965, 14 (♂*, resurrected from syn.); place after *pallidiventer.*

Genus WYEOMYIA Theobald
Subgenus WYEOMYIA Theobald

79. *culebrae* Dyar.—Change "1926" to "1923."
80. *labesba* Howard, Dyar and Knab.—Change "Ancon" to "Tabernilla."

Subgenus DENDROMYIA Theobald

84. **belkini** Casal and García.—Argentina.
1966. Physis 26: 155 (♂*, ♀*, L*, P*). Type-loc: Igu, Misiones, Argentina (INM).

Genus PHONIOMYIA Theobald

89. **lassalli** (Bonne-Wepster and Bonne).—Change "LU" to "USNM." Lectotype here selected bears labels: Trinidad, W.I./F.W. Urich Collector/ B12-6/ See slide No. 364/ ♂ of *trinidadensis* D. K. ident. 1906; terminalia on slide 364.

Genus LIMATUS Theobald

90. *Simondella.*—Change "Lavaran" to "Laveran."

Genus SABETHES Robineau-Desvoidy
Subgenus SABETHES Robineau-Desvoidy

91. *kappleri* Bonne.—Change "LU" to "NE."

Subgenus SABETHOIDES Theobald

93. *rangeli* Surcouf and Gonzales-Rincones.—Change "Sabethoides" to "*Sabethoides*."

Genus TOPOMYIA Leicester

95. **aureoventer** Theobald.—Change "BM" to "IM"; only slide of wing and leg in BM.

Genus FICALBIA Theobald
Subgenus RAVENALITES Doucet

100. **deguzmanae** Mattingly.—Delfinado, 1966, 20 (♂*, ♀, P*, L*).

Genus MANSONIA Blanchard

101. **Genus MANSONIA Blanchard.**—Transfer with following line to p. 104 preceding **Subgenus MANSONIOIDES**.

Genus COQUILLETTIDIA Dyar

Insert **Genus COQUILLETTIDIA** before **Subgenus COQUILLETTIDIA**.

Important references: 1962, Wharton, 1-114 (Malaya); 1962 (1963), Ronderos and Bachmann, 48-51 (to generic status).

Subgenus COQUILLETTIDIA Dyar

crassipes (Van der Wulp).—Wharton, 1962, 6 (♂*, ♀, P*, L*, E).

102. **giblini** (Taylor).—Delete "Australia, Philippines, Formosa, Malaya, Thailand, Burma."

nigrosignatus Edwards.—Transfer to p. 103 as valid sp.

hodgkini (Wharton).—Malaya, Indonesia.

1962. Inst. med. Res. Malaya, Bull. 11: 12 (♂*, ♀*; *Mansonia*). Type-loc: Lamir (Pekan), Pahang, Malaya (BM).

103. **nigrosignata** (Edwards).—Malaya, Indonesia, Philippines. Wharton, 1962, 7 (♂*, ♀*, L*, E; resurrected from synonymy).

testaceus Van der Wulp.—Delete "[?] United States."

104. **samoaensis** Stone.—Samoa.

1966. Proc. ent. Soc. Wash. 68: 331 (♂*, ♀). Type-loc: Tabalogi Ridge, Tau Island, Manua Group, Eastern Samoa (USNM).

Subgenus RHYNCHOTAENIA Brèthes

Insert **Subgenus RHYNCHOTAENIA**, its synonym, and all its species to follow species of **Subgenus COQUILLETTIDIA**.

Genus MANSONIA Blanchard

Insert **Genus MANSONIA Blanchard**. *Important references:* 1962, Wharton, 1-114 (Malaya); 1962 (1963), Ronderos and Bachmann, 46-48.

Subgenus MANSONIOIDES Theobald

105. **annulata** Leicester.—Celebes. Wharton, 1962, 15 (♂*, ♀*, P*, L*, E).
annulifera (Theobald).—Delfinado, 1966, 23 (♂*, ♀*).
bonneae Edwards.—Wharton, 1962, 17 (♂*, ♀*, P*, L*, E).
dives (Schiner).—Wharton, 1962, 20 (♂*, ♀*, P*, L*, E).
papuensis (Taylor).—Change "201" to "200" and "*Melanoconion*" to "*Taeniorhynchus.*"

Subgenus MANSONIA Blanchard

106. *Important reference:* 1963, Ronderos and Bachmann, 57-65 (keys).
pseudotitillans (Theobald).—Ronderos and Bachmann, 1963, 61 (♂*, ♀*, P*, L*).
titillans (Walker).—Ronderos and Bachmann, 1963, 61 (♂*, P*, L*, E*).
107. Transfer **Subgenus RHYNCHOTAENIA**, its synonyms, and all its species to p. 104 as subgenus of **COQUILLETTIDIA**.

Subgenus Uncertain

108. **aurata** Dobrotworsky.—Australia.
1962. Proc. Linn. Soc. N.S.W. 87: 295 (♀*). Type-loc: Cabbage Tree Creek, Victoria, Australia (NMM).
variegata Dobrotworsky.—Australia.
1962. Proc. Linn. Soc. N.S.W. 87: 293 (♂*, ♀*). Type-loc: Cann River, Victoria, Australia (NMM).

Genus URANOTAENIA Lynch Arribálzaga

albescens Taylor.—Peters, 1964, 27 (A, P*, L). Delete Penn 1949b reference.
109. **albosternopleura** Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 203 (♂, ♀*). Type-loc: Maprik, Sepik Distr., New Guinea (CSIR).
amiensis Peters.—New Guinea, Papua.
1963. Proc. R. ent. Soc. Lond. (B) 32: 207 (♂*, ♀*). Type-loc: Ami, 10 miles nw. of Maprik, Sepik Distr., New Guinea (CSIR).
annandalei Barraud.—Philippines. Delfinado, 1966, 39 (♂*, ♀, P*, L*).
arguellesi Baisas.—Delfinado, 1966, 40 (♂*, ♀, P*, L*).
argyrotarsis Leicester.—Peters, 1964, 25 (♂*, ♀, P, L).
110. **benoiti** Wolfs.—Congo.
1964, *in* Benoit, Mus. Roy. Afr. Centr. Ann., Sci. Zool. 132: 309 (L*). Type-loc: Mwendua River, Kasongo, Congo (CMT).
bertii Cova García and Rausseo.—Venezuela.
1964. Rev. Sanid. Asist. soc. 29: 221 (♂*, ♀, P*, L*). Type-loc: Cumbre de Choroni, Aragua, Venezuela (DERM).
bimaculata Leicester.—Delete Philippines.
111. **cavernicola** Mattingly.—Vattier and Adam, 1962 (1963), 911 (♂*, P*, L*).
112. **clara** Dyar and Shannon.—Delfinado, 1966, 42 (♂*, P*, L*).
113. **hirsutifemora** Peters.—Papua.
1964. Proc. Roy. ent. Soc. Lond. (B) 33: 21 (♂*, ♀*). Type-loc: Port Moresby, Central District, Papua (CSIR).

115. **ludlowae** Dyar and Shannon.—Delfinado, 1966, 47 (♂, ♀, L; syn.).
reyi Baisas.

maculipleura Leicester.—Wattal and Kalra, 1965, 312 (♂*).

mendiolai Baisas.—Delfinado, 1966, 48 (♂*, ♀, P*, L*).

116. **moresbyensis** Peters.—Papua.
1963. Proc. R. ent. Soc. Lond. (B) 32: 204 (♂*). Type-loc: Port Moresby, Central Distr., Papua (CSIR).

nivea Leicester.—Delfinado, 1966, 50 (♂*, ♀, L*).

117. **novaguinensis** Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 141 (♂*, ♀, P*, L). Type-loc: Ami, 10 miles nw. of Maprik, Sepik District, New Guinea (CSIR).
ssp. **alticola** Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 142 (♂, ♀). Type-loc: Goroka, Eastern Highlands District, New Guinea (CSIR).

obscura Edwards.—Third line, change "Edwards, 1928" to "Edwards and Given, 1928."

118. **paralateralis** Peters.—New Guinea.
1964. Proc. R. ent. Soc. Lond. (B) 33: 19 (♂*, ♀). Type-loc: Kavieng, New Ireland District, New Guinea (CSIR).

paranovaguinensis Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 135 (♂*, P*, L*). Type-loc: Maprik, Sepik District, New Guinea (CSIR).

philippinensis Delfinado.—Philippines.
1966. J. med. Ent. 3: 36 (♂*, ♀, P*, L*). Type-loc: San Jose, Mindoro, Philippines (USNM).

reyi Baisas.—Transfer to p. 115 as synonym of *ludlowae* Dyar and Shannon.

rossi Delfinado.—Philippines.
1966. J. med. Ent. 3: 36 (♂*, ♀). Type-loc: San Jose, Mindoro, Philippines (USNM).

119. **testacea** Theobald.—Delfinado, 1966, 53 (♂*, ♀, P*, L*).

120. **tubanguii** Baisas.—Delfinado, 1966, 55 (♂*, ♀, P*, L*).

Genus HODGESIA Theobald

121. **malayi** Leicester.—Delfinado, 1966, 58 (♂*, P*, L*).

Genus ORTHOPODOMYIA Theobald

122. *Thomasina* Newstead and Carter.—Change "Newstead and Carter" to "Newstead and Thomas" after *Mansonia longipalpis*.

nigritarsis Leicester.—Change "(NE)" to "(BM)."

123. *albipes* Giles.—Delete entirely. Giles was not treating a Philippine species.

nkolbissonensis Rickenbach and Hamon.—Cameroon.
1966 (1965). Bull. Soc. Path. exot. 58: 1112 (♂*, ♀*). Type-loc: Nkolbisson, 8 km from Yaounde, S. Cameroon (IERT).

Genus AEDEOMYIA Theobald

124. **catasticta** Knab.—Delfinado, 1966, 72 (♂, ♀, P*, L*).

Genus PSOROPHORA Robineau-Desvoidy
Subgenus PSOROPHORA Robineau-Desvoidy

125. **ciliata** (Fabricius).—Delete West Indies. Guedes et al., 1965, 15 (♂*, ♀*).
cilipes (Fabricius).—Guedes et al., 1965, 15, 16 (♂*, ♀*).
126. **holmbergii** (Lynch Ariibálzaga).—Guedes et al., 1965, 16 (♀*).
lineata (Humboldt).—Delete Argentina, French Guiana, Brazil, Bolivia.
saeva Dyar and Knab.—Transfer below as valid species with *genu-maculata* as synonym.
pallescens Edwards.—Guedes et al., 1965, 18 (♀*).
saeva Dyar and Knab.—Argentina, Brazil, Surinam, Trinidad, Venezuela, ?Bolivia, ?French Guiana. Stone, 1967 (in press) (resurrected from synonymy).

Subgenus JANTHINOSOMA Lynch Arribálzaga

Important reference: 1964, Guedes and Souza, 471-486 (key).
albigenu Peryassú.—Argentina, Bolivia, Brazil, Paraguay, Peru, Venezuela (northern limits of distribution uncertain). Guedes and Souza, 1964, 474 (♂*, ♀*, P*, L*; resurrected from synonymy).
paraguayensis Strickland.
bruchi Petrocchi.
albipes (Theobald).—Guedes and Souza, 1964, 476 (♂*, P*, L*).
127. **circumflava** Cerqueira.—Peru. Guedes et al., 1965, 18 (P*).
cyanescens (Coquillett).—Guedes et al., 1965, 18 (♂*, ♀*).
discrucians (Walker).—Guedes et al., 1965, 19 (♂*, ♀*).
ferox (Humboldt).—Guedes et al., 1965, 19 (♂*, ♀*).
pazosi Pazos.—Insert before "Cuba," "Vuelta Abajo (Las Villas)."
128. **fiebrigi** Edwards.—Paraguay, Bolivia. Souza and Guedes, 1962, 249 (♂*, ♀*; resurrected from synonymy).
forceps Cerqueira.—Guedes et al., 1965, 20 (♂*, ♀*).
lanei Shannon and Cerqueira.—Guedes et al., 1965, 18 (♀*).
lutzii (Theobald).—Change "*Janthinosoma*" to "*Janhtinosoma.*" Guedes et al., 1965, 21 (♂*, ♀*).
varipes (Coquillett).—Distribution and identity uncertain. Possibly Central American *varipes* is different from that in United States; most South American "*varipes*" is *albigenu.*
129. *albigenu* Peryassú.—Transfer to p. 128 as valid species with *paraguayensis* and *bruchi* as synonyms.

Subgenus GRABHAMIA Theobald

cingulata (Fabricius).—Guedes et al., 1965, 21, 22 (♂*, ♀*).
neoapicalis Theobald.—Insert "; *Culex*" at end of second line, within parenthesis.
confinnis (Lynch Arribálzaga).—Guedes et al., 1965, 23 (♂*, ♀*).
130. **dimidiata** Cerqueira.—Guedes et al., 1965, 23 (♂*, ♀*).
discolor (Coquillett).—Change date from "1930" to "1903."
paulli Paterson and Shannon.—Guedes et al., 1965, 18 (♀*).
131. **varinervis** Edwards.—Guedes et al., 1965, 24 (♂*, ♀*).

Genus ERETMAPODITES Theobald

135. **tonsus** Edwards.—Someren and Hamon, 1964, 82-84 (P*, L*)

Genus AEDES Meigen
Subgenus OCHLEROTATUS Lynch Arribálzaga

137. *Aedes,* subgenus *Kompia* Aitken.—Transfer to p. 157 before **Subgenus FINLAYA** as valid subgenus.
138. **albifasciatus** (Macquart).—Ronderos and García 1962 (1963)a, 35 (P*).
angustivittatus Dyar and Knab.—Ronderos and García, 1962 (1963)a, 37 (P*).
meprai Martínez and Prosen.—Ronderos and García, 1962 (1963)b, 38 (syn.).
antipodeus (Edwards).—Marks and Nye, 1963, 50 (♂*, ♀, P*, L*).
139. *praeteritus* Segúy.—Transfer to p. 150 as synonym of *pulchritarsis.*
141. *africanus* Neveu-Lamaire.—Change "*taeniorhynchus*" to "*Taeniorhynchus.*"
142. *borealis* Ludlow.—Change "Culex" to "*Culex.*"
communis (De Geer).
143. ssp. **nevadensis** Chapman and Barr.—Nevada.
1964. Mosq. News 24: 444 (♂*, ♀, P*, L). Type loc: Lamoille Canyon, Elko Co., Utah, United States (USNM).
patersoni Shannon and Del Ponte.—Transfer to p. 150 as valid sp.
145. **explorator** Marks.—Australia.
1964. Pap. Dep. Ent. Univ. Qd. 2: 60 (♀*, L*). Type-loc: Mt Olga, 300 mi. sw. of Alice Springs, Northern Territory, Australia (UQ).
146. **fryeri** (Theobald).—Mattingly, 1963, 165 (L*).
147. **imperfectus** Dobrotworsky.—Australia.
1962. Proc. Linn. Soc. N.S.W. 87: 296 (♂*, ♀, P*, L*). Type-loc: Woori Yallock, Victoria, Australia (USNM).
148. **lasaensis** Meng.—China.
1962. Acta ent. Sinica 11: 159 (♂*, L*). Type-loc: Lasa [Tibet, China] (LU).
linesi Marks.—Australia.
1964. Pap. Dep. Ent. Univ. Qd. 2: 63 (♀). Type-loc: Robe, South Australia, Australia (CSIR).
meprai Martínez and Prosen.—Transfer to p. 138 as synonym of *angustivittatus.*
149. **mombasaensis** Mattingly.—Kenya.
1963. Proc. R. ent. Soc. Lond. (B) 32: 165 (♂, ♀, L*). Type-loc: Mombasa, Kenya (BM).
nigrithorax (Macquart).—Dobrotworsky, 1966, 135 (♀*, L).
150. **patersoni** Shannon and Del Ponte.—Ronderos and García, 1962 (1963)a, 35 (P); (resurrected from syn.).
phaecasiatus Marks.—Australia.
1964. Pap. Dep. Ent. Univ. Qd. 2: 64 (♀). Type-loc: 5 miles from Maningrida, Arnhem Land, Northern Territory, Australia (UQ).
pulchritarsis (Rondani).
praeteritus Segúy.—Coluzzi, in litt. (syn.).
151. **purpureipes** Aitken.—Transfer to p. 157 under **Subgenus KOMPIA.**
153. *luteovittata* Theobald.—Insert after "*Culex*" "*nemorosus* var."
sapiens Marks.—Australia.
1964. Pap. Dep. Ent. Univ. Qd. 2: 66 (♂*, ♀*). Type-loc: North Bourke, New South Wales, Australia (CSIR).
mathisi Neveu-Lemaire.—Change "French Guiana" to "Brazil."

154. **simanini** Gutsevich.—U.S.S.R. (Uzbekistan).
1966. Zool. Zhur. 45: 457 (♂*, ♀). Type-loc: Kokand, Fergana Valley, Uzbekistan (ZIL).
dorso-vittatus Villeneuve.—Insert after "*Culex*", "*nemorosus* var."
155. **subalbirostris** Klein and Marks.—Marks and Nye, 1963, 56 (♂*, ♀*, P*, L*).
157. Insert **Subgenus KOMPIA Aitken**. Mattingly, 1961, 16 (returned to subgeneric status).
purpureipes Aitken.—Insert from p. 151 under **Subgenus KOMPIA**.

Subgenus FINLAYA Theobald

165. **kompi** Vargas and Downs.—Arizona.
167. **mjoebergi** (Edwards).—Change to "*mjöbergi.*"
168. **occidentalis** (Skuse).
ssp. **milsoni** (Taylor).—Dobrotworsky, 1962, 301 (as sp.; P*, L*).
170. **shintiensis**.—Change "Lein" to "Lien."
171. **sorsogonensis** Bañez and Jueco.—Philippines.
1966. Acta med. Philippina 2(4): 195 (♂*, ♀*, L*). Type-loc: Sorsogon Province, [Luzon] (IHP).
stanleyi Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 1 (♂, ♀, P*, L*). Type-loc: Minj, Western Highlands District, New Guinea (CSIR).
subbasalis Dobrotworsky.—Australia.
1962. Proc. Linn. Soc. N.S.W. 87: 298 (♂*, ♀, P*, L*). Type-loc: Ginninderra Falls, New South Wales, Australia (CSIR).
172. **tutuilae** Ramalingam and Belkin.—Samoa.
1965. Contr. Amer. ent. Inst. 1(4): 3 (♂*, ♀, P*, L*). Type-loc: Aoloau, Tutuila, American Samoa (USNM).

Subgenus HOWARDINA Theobald

173. **allotecnon** Kumm, Komp and Ruiz.—Add to type-locality, "Poás Volcano."
arborealis Bonne-Wepster and Bonne.—Change "USNM" to "ITH."
aurivittatus Cerqueira.—Martínez, Prosen and Carcavallo, 1964, 54 (♂*).
cozumelensis Díaz Nájera.—Mexico.
1966. Rev. Invest. Salud. publ. (Mex.) 26: 334 (♂*, ♀*, P*, L*). Type-loc: San Miguel de Cozumel, Quintana Roo, Mexico (ISET).

Subgenus CHAETOCRUIOMYIA Theobald

175. **calabyi** Marks.—Marks, 1964, 132 (♀).
elchoensis Taylor.—Marks, 1964, 134 (♂*, ♀, P*, L*).
macmillani Marks.—Australia.
1964. Proc. Linn. Soc. N.S.W. 89: 138 (♂*, ♀*). Type-loc: N.W. Dungog, Gummi Plain, Barrington Area, New South Wales (US).
spinosipes Edwards.—Marks, 1964, 142 (♀, E*).

Subgenus HALAEDES Belkin

176. **australis** (Erichson).—New Zealand.

Subgenus GEOSKUSEA Edwards

177. **tonsus** Edwards.—Mattingly, 1965, 23 (♂*). Delete "? Celebes."

Subgenus STEGOMYIA Theobald

180. **albopictus** (Skuse).—Restore New Guinea, deleted in Suppl. I.
181. **arboricolus** Knight and Rozeboom.—Change to **arboricola**.
182. **bambusicolus** Knight and Rozeboom.—Change to **bambusicola**.
183. Supplement II. *montana* Koidzumi. Change reference given to: "1918. Trans. nat. Hist. Soc. Formosa 38: 141 (♂; *Stegomyia*). Type-loc: Chikutoki, Kagi District, Formosa (LU)."

gardnerii (Ludlow).

ssp. **imitator** (Leicester).—Malaya, Nepal, S. China. Mattingly, 1965, 36 (resurrected from synonymy; syn.).

christianus Dyar.

184. **hensilli** Farner.—Transfer to p. 187 as ssp. of *scutellaris*.

laffooni Knight and Rozeboom.—Knight and Hull, 1951, 221 (L).

186. **paullusi** Stone and Farner.—North Borneo.
187. **scutellaris** (Walker).—Delete Philippines. Colless, 1962, 313 (♂*, taxon).

ssp. **hensilli** Farner.—Delete Singapore of Suppl. I. Colless, 1962, 314 (to ssp. status).

ssp. **malayensis** Colless.—Singapore, Malaya, Philippines. 1962. Proc. Linn. Soc. N.S.W. 87: 314 (♂*, ♀). Type-loc: Pulau Hantu, Keppel Harbor, Singapore (CSIR).

188. **tabu** Ramalingam and Belkin.—Tonga Islands. 1965. Contr. Amer. ent. Inst. 1(4): 1 (♂*, ♀, P*, L). Type-loc: Eua Island, Tonga (USNM).

usambara Mattingly.—Someren and Hamon, 1964, 80 (P*).

vinsoni Mattingly.—Mattingly, 1963, 168 (♀).

189. *imitator* Leicester.—Transfer to p. 183 as ssp. of *gardnerii*.

christianus Dyar.—Transfer to p. 183 as synonym of *gardnerii imitator*.

Subgenus AEDIMORPHUS Theobald

190. **albocephalus** Theobald.—Change reference to "Mem. Lpool Sch. trop. Med. 10(App.): 4.

arabiensis (Patton).—Transfer with synonym to p. 198 as synonym of *vexans* (Meigen).

192. **dialloi** Hamon and Brengues.—Dahomey. 1965. Bull. Soc. Path. exot. 58: 103 (♂*). Type-loc: Tchakarkou, Natitingou Prefecture, Dahomey (IERT).

ebogoensis Rickenbach and Ferrara.—Cameroon. 1966. Bull. Soc. Path. exot. 58: 26 (♂*). Type-loc: Ebogo, Cameroon (IERT).

hamoni Mattingly.—Nigeria. 1963. Proc. R. ent. Soc. Lond. (B) 32: 166 (♂*, ♀*). Type-loc: Akute Village, Ogun River, near Iju waterworks, S. Nigeria (BM).

194. **lottei** Hamon and Brengues.—Ivory Coast. 1965. Bull. Soc. Path. exot. 58: 101 (♂*). Type-loc: Tiassalé, Ivory Coast (IERT).

195. **niveoscutellum** (Theobald).—Delete asterisk after "♂."
nocturnus Theobald.—Hawaii. Correction to Suppl. II. Change "125" to "195."
nyounae Hamon and Adam.—Brengues and Hamon, 1965, 92 (P*, L*).
196. **rickenbachi** Hamon and Adam.—Rickenbach and Ferrara, 1964, 972, (L*, P*).
198. **tauffliebi** Rickenbach and Ferrera.—Cameroon.
1965. Bull. Soc. Path. exot. 58: 24 (♂*). Type-loc: Mbéga, Dept. Dyong and Sanaga, Cameroon (IERT).
vexans (Meigen).—Hamon et al., 1966, 373 (syn.).
arabiensis Patton.—Insert in synonymy after *montcalmi.*
sudanensis Theobald.—Insert in synonymy after *eruthrosops.*

Subgenus NEOMELANOCONION Newstead

200. Supplement II. Le Berre and Hamon reference inadvertently left out of "Literature Cited." See that section in this Supplement.
aurovenatus Worth.—Supplement I. Change type locality from "Nduma" to "Ndumu."
201. **palpalis** (Newstead).—Gambia.
taeniarostris (Theobald).—Bailly-Choumara, 1965 (1966), 671 (P*, L*).

Subgenus DICEROMYIA Theobald

202. **periskelatus** (Giles).—Qutubuddin, 1945, 34 (♀).
203. **whartoni** Mattingly.—Malaya.
1965. Culic. Mosq. Indomalayan Area VI: 65 (♂*, P*, L*). Type-loc: Ulu Gombak, Malaya (BM).

Subgenus AEDES Meigen

207. **nubicolus** Laffoon.—Change to **nubicola.**
209. **uncus** (Theobald).—Knight and Hull, 1951, 222 (L).

Subgenus CANCRAEDES Edwards

210. *miachaetessa* Dyar and Shannon.—Change "1935" to "1925."
lateralis Theobald.—Change "1919" to "1818."

Genus ARMIGERES Theobald
Subgenus ARMIGERES Theobald

212. **baisasi** Stone and Thurman.—Baisas 1935, 488 (♂*, ♀; as *kuchingensis*); Delfinado, 1966, 80 (♂*; ♀, P*, L*).
213. **kuchingensis** Edwards.—Transfer Baisas's 1935b reference to *baisasi* Stone and Thurman.
malayi (Theobald).—Philippines.
manalangi Baisas.—Delfinado, 1966, 86 (♂*, ♀, P*, L*).
papuensis Peters.—New Guinea.
1963. Proc. R. ent. Soc. Lond. (B) 32: 4 (♂*, ♀*, P*, L*). Type-loc: Maprik, Sepik District, New Guinea (BM).
setifer Delfinado.—Philippines.
1966. Mem. Amer. ent. Inst. 7: 87 (♂*, ♀*). Type-loc: Pinigisan, Mantalingajan, Palawan, Philippines (ZMC).

Subgenus LEICESTERIA Theobald

214. **digitatus** Edwards.—Delfinado, 1966, 88 (♂*, ♀, P*, L*).
flavus Leicester.—Delfinado, 1966, 89 (♂*, ♀, P*, L*).
magnus (Theobald).—Delfinado, 1966, 91 (♂*, ♀, P*, L*).
215. **omissus** (Edwards).—Delfinado, 1966, 92 (♂*, ♀, P*, L*).

Genus CULISETA Felt

218. *Important references:* 1963, Barr, 324-330 (key pupae, Nearctic); 1964, Maslov, Ent. Obozr. 43: 193-217 (Ent. Rev. : 97-107) (taxonomy).

Subgenus CULISETA Felt

alaskaensis (Ludlow).—Barr, 1963, 328 (P*).
ssp. **indica** (Edwards).—India, Pakistan. Maslov, 1964, 203 (100) (to ssp. status).
annulata (Schrank).
ssp. **subochrea** (Edwards).—Maslov, 1964, 204 (100) (to ssp. status).
atlantica (Edwards).—Insert from p. 222.
219. **zottae** (Ungureanu).—Change from ssp. to syn.
impatiens (Walker).—Barr, 1963, 329 (P).
incidens (Thomson).—Barr, 1963, 328 (P*).
particeps (Adams).—Barr, 1963, 328 (P*).
sinensis (Meng and Wu).—China.
1962. Acta ent. Sinica 11: 382 (♂*, ♀, P, L*; *Theobaldia*).
Type-loc: China (LU).
220. **subochrea** (Edwards).—Transfer with its synonym to p. 218 as ssp. of *annulata* (Schrank).

Subgenus CULICELLA Felt

atra Lee.—Insert from p. 222.
minnesotae Barr.—Transfer to p. 221 as ssp. of *silvestris* (Shingarev).
morsitans (Theobald).—Delete northern North America.
ssp. **dyari** (Coquillett).—Northern North America. Maslov, 1964, 209 (103) (to ssp. status).
brittoni Felt.
221. **ochroptera** (Peus).—Place as ssp. of *silvestris* (Shingarev).
silvestris (Shingarev).
ssp. **ochroptera** (Peus).—Maslov, 1964, 209 (103) (to ssp. status).
ssp. **minnesotae** Barr.—Maslov, 1964, 209 (103) (to ssp. status).
ssp. **amurensis** Maslov.—China.
1964. Ent. Obozr. 43: 210 (♂*, ♀, L). Type-loc: Central Amur Region, Ussuri Basin, Southern Maritime Province, Northeast China (LU).

Subgenus CLIMACURA Howard, Dyar and Knab

antipodea Dobrotworsky.—Australia.
1962. Proc. Linn. Soc. N.S.W. 87: 291 (♂*, ♀, P*, L*). Type-loc: Cann River, Victoria (NMM).
melanura (Coquillett).—Barr, 1963, 327 (P*).
weindorferi (Edwards).—Dobrotworsky, 1966, 143 (♂*, ♀, P*, L*).

Subgenus ALLOTHEOBALDIA Brolemann

indica (Edwards).—Transfer to p. 218 as ssp. of *alaskaensis* (Ludlow).

Subgenus Uncertain

222. **atlantica** (Edwards).—Transfer to p. 218 in subgenus *Culiseta*.
atra Lee.—Transfer to p. 220 in subgenus *Culicella*.

Genus CULEX Linnaeus
Subgenus LUTZIA Theobald

223. **fuscanus** Wiedemann.—Delfinado, 1966, 97 (♂*, ♀, P*, L*).
setulosus Doleschall.—Change "1875" to "1857."
224. *bimaculata* Theobald.—Insert after "♀" "; as var."
fusca Theobald.—Insert after "A" "; as var."

Subgenus NEOCULEX Dyar

225. **amaniensis** Someren and Hamon.—Tanzania.
1964. J. ent. Soc. S. Afr. 27: 78 (♂*, ♀*). Type-loc: Amani, Tanganyika (BM).
226. **brevipalpis** (Giles).—Delfinado, 1966, 125 (♂*, ♀, P*, L*).
227. **garioui** Bailly-Choumara and Rickenbach.—Cameroon.
1966. Bull. Soc. Path. exot. 59: 144 (♂*). Type-loc: Mbol, Yokadouma, E. Cameroon (IERT).
228. **laplantei** (Hamon, Adam and Mouchet).—Change "Eboga" to "Ebogo."
nematoides Dyar and Shannon.—Insert "♀."
pseudoandreanus Bailly-Choumara.—Cameroon.
1965 (1966). Bull. Soc. Path. exot. 58: 660 (♂*). Type-loc: Ebogo, Arrondissement de Mbalmayo, 100 km. s. of Yacundé, Cameroon (IERT); Bailly-Choumara and Pajot, 1965 (1966): 665 (P*, L*).
229. *capensis* De Meillon.—Insert after "♀" "as var."

Subgenus MOCHTHOGENES Edwards

231. **chiyutoi** Baisas.—Delfinado, 1966, 129 (♂*, P, L).
culionicus Delfinado.—Philippines.
1966. Mem. Amer. ent. Inst. 7: 130 (♂*, ♀). Type-loc: San Pedro, Culion I., Palawan, Philippines (USNM).
latifoliatus Delfinado.—Philippines.
1966. Mem. Amer. ent. Inst. 7: 131 (♂*, ♀). Type-loc: Molawin Creek, College, Laguna, Philippines (USNM).
laureli Baisas.—Philippines. Delfinado, 1966, 132 (♂*, ♀, P*, L*; resurrected from synonymy).
malayi (Leicester).—Delete Philippines and remove *laureli* from synonymy.
shrivastavii Wattal, Kalra and Krishnan.—Andaman Islands.
1966. Bul. Ind. Soc. Mal. Com. Dis. 3: 159 (♂*). Type-loc: Ferrar Ganj, S. Andaman Islands (NCID).
232. **tricontus** Delfinado.—Philippines.
1966. Mem. Amer. ent. Inst. 7: 133 (♂*). Type-loc: Molawin Creek, College, Laguna, Philippines (USNM).

uncinatus Delfinado.—Philippines.
1966. Mem. Amer. ent. Inst. 7: 134 (♂*, ♀). Type-loc: Osmena, Samar (USNM).

Subgenus LOPHOCERAOMYIA Theobald

Important reference: 1965, Colless, 216-307 (Malaya, keys).

aculeatus Colless.—Malaya.
1965. J. med. Ent. 2: 286 (♂*, ♀, L*). Type-loc: Bukin Tungal, Kg. Gajan Forest Reserve, Perak, Malaya (ANIC).

acutipalus Colless.—Malaya.
1965. J. med. Ent. 2: 299 (♂*, ♀, L). Type-loc: Kg. Chantek Bahru, Singapore (ANIC).

alphus Colless.—Malaya, Borneo.
1965. J. med. Ent. 2: 283 (♂*, ♀, L*). Type-loc: Kg-Sijankang, Selangor, Malaya (ANIC).

atracus Colless.—Change "BM" to "CSIR."

christiani Colless.—Change "BM" to "CSIR."

bandoengensis Brug.—Java, Malaya. Colless, 1965: 292 (♂*, ♀, L; to sp. status).

bengalensis Barraud.—India, Malaya, Hainan I. Colless, 1965, 293 (♂*, ♀, L*; to sp. status).

bicornutus (Theobald).—Burma, Malaya, Botel Tobagu (nr. Formosa). Colless, 1965, 291 (♂*, L*; resurrected from syn.).

brevipalpus (Theobald).—Stone, 1957, 172 (resurrected from syn.); Colless, 1965, 301 (♂*, ♀, L).

cinctellus Edwards.—Philippines.

crassicornis Colless.—Malaya.
1965. J. med. Ent. 2: 296 (♂*). Type-loc: Ulu Gombak, Selangor Malaya (ANIC).

cubitatus Colless.—Malaya.
1965. J. med. Ent. 2: 273 (♂*, ♀, L). Type-loc: Mandai Road, Singapore (ANIC).

curtipalpis (Edwards).—Edwards, 1928, 279 (♂*); Colless, 1965, 301 (♂*, ♀, L).

demissus Colless.—Malaya.
1965. J. med. Ent. 2: 296 (♂*). Type-loc: Ulu Gombak, Selangor, Malaya (ANIC).

233. **eminentia** (Leicester).—Colless, 1965, 298 (♂*, L).

brevipalpus Theobald.—Transfer to p. 232 as valid species.

eukrines Bram and Rattanarithikul.—Thailand.
1967. Proc. ent. Soc. Wash. 69: 11 (♂*, ♀, L*). Type-loc: Huai Bong Ti, Kanchanaburi Province, Thailand (USNM).

variata Leicester.—Change "NE" to "BM." Transfer to p. 235 as valid species.

fuscosiphonis Bram and Rattanarithikul.—Thailand.
1967. Proc. ent. Soc. Washington 69: 11 (♂*, ♀, L*). Type-loc: Muang, Phattalung Province, Thailand (USNM).

ganapathi Colless.—Malaya.
1965. J. med. Ent. 2: 294 (♂*, ♀, L*). Type-loc: Ulu Langat, Selangor, Malaya (ANIC).

gibbulus Delfinado.—Philippines.
1966. Mem. Amer. ent. Inst. 7: 105 (♂*). Type-loc: San Jose, Mindoro, Philippines (USNM).

hewitti (Edwards).—Colless, 1965, 303 (♂*, ♀, L).
incomptus Bram and Rattanarithikul.—Thailand.
1967. Proc. ent. Soc. Wash. 69: 16 (♂*, ♀). Type-loc: Doi Sutep, Chiang Mai Province, Thailand (USNM).
inculus Colless.—Malaya.
1965. J. med. Ent. 2: 280 (♂*, ♀, L*). Type-loc: Kampong Sireh, Selangor, Malaya (ANIC).
josephinae Baisas.—Change to *josephineae* and transfer to p. 234 as valid species.
234. **josephineae** Baisas.—Philippines. Delfinado, 1966, 106 (♂*; resurrected from synonymy).
lucaris Colless.—Malaya.
1965. J. med. Ent. 2: 299 (♂*). Type-loc: Ulu Pandan, Singapore (ANIC).
bicornuta Theobald.—Transfer to p. 232 as valid species.
macdonaldi Colless.—Malaya, Philippines.
1965. J. med. Ent. 2: 276 (♂*, L*). Type-loc: Singapore (ANIC); Delfinado, 1966, 108 (♂*, P*, L*).
mammilifer (Leicester).—Hainan I. Colless, 1965, 287 (♂*, ♀, L*; syn.); Delfinado, 1966, 109 (♂*, P*, L*).
chiungchungensis Hsü.—1963. Acta ent. Sinica 12: 229 (♂*, ♀, L*). Type-loc: Chiungchungsang, Hainan Island, Kwangtung Province, China (LU).
minor (Leicester).—Colless, 1965, 289 (♂*, ♀, L*; syn.).
nolledoi Baisas.
var. **bengalensis** Barraud.—Transfer to p. 232 as full species.
var. **bandoengensis** Brug.—Transfer to p. 232 as full species.
235. **navalis** Edwards.—Malaya. Colless, 1965, 304 (♂*, ♀, L).
niger (Leicester).—Colless, 1965, 282 (♂*, ♀, L).
nolledoi Baisas.—Transfer to p. 234 as synonym of *minor* (Leicester).
petersi Colless.—Change "BM" to "CSIR."
pseudornatus Colless.—Change "BM" to "CSIR."
peytoni Bram and Rattanarithikul.—Thailand.
1967. Proc. ent. Soc Wash. 69: 7 (♂*, ♀, L*). Type-loc: Phatthalung-Trang Road, Phatthalung Province, Thailand (USNM).
pholeter Bram and Rattanarithikul.—Thailand.
1967. Proc. ent. Soc. Wash. 69: 13 (♂*, ♀, L*). Type-loc: Khao Mai Ha Wa, Chon Buri Province, Thailand (USNM).
reidi Colless.—Malaya, Philippines.
1965. J. med. Ent. 2: 279 (♂*, ♀, L*). Type-loc: West Coast Road, Singapore (ANIC).
spiculosus Bram and Rattanarithikul.—Thailand.
1967. Proc. ent. Soc. Wash. 69: 3 (♂*, ♀, L*). Type-loc: Doi Sam Sao, Tak Province, Thailand (USNM).
traubi Colless.—Malaya.
1965. J. med. Ent. 2: 295 (♂*, ♀, L*). Type-loc: Ulu Gombak, 16th mile, Selangor, Malaya (ANIC).
uniformis (Theobald).—Philippines.
variatus (Leicester).—Colless, 1965, 270 (♂*, ♀, L*; resurrected from synonymy).
whartoni Colless.—Malaya.
1965. J. med Ent. 2: 275 (♂*, ♀, L*). Type-loc: Singapore (ANIC).

wilfredi Colless.—Malaya.
1965. J. med. Ent. 2: 297 (♂*). Type-loc: Malaya (ANIC).

Subgenus CULICIOMYIA Theobald

238. **pallidothorax** Theobald.—Philippines.
papuensis (Taylor).—Philippines.
ramakrishnii Wattal and Kalra.[2]—India.
1965. Bull. Ind. Soc. Mal. Com. Dis. 2: 309 (♂*, ♀). Type-loc: Lachhiwala Reserve Forest, Dehra Dun, India (NICD).
spathifurca (Edwards).—Delfinado, 1966, 123 (♂*, ♀, P, L*).

Subgenus THAIOMYIA Bram

239. **Culex**, subgenus **Thaiomyia** Bram, 1966, Proc. ent. Soc. Wash. 68: 73. Orthotype: *Culex dispectus* Bram.
dispectus Bram.—Thailand.
1966. Proc. ent. Soc. Wash. 68: 75 (♂*, ♀, P*, L*). Type-loc: Doi Sam Sao, Tak Province, Thailand (USNM).

Subgenus CULEX Linnaeus

Important reference: 1967, Bram, 1-222 (keys, New World).
Lasioconops Theobald.—Change reference to Mem. Lpool Sch. trop. Med. 10 (App.): 8.
240. **abnormalis** Lane.—Colombia. Bram, 1967, 20 (♂*, ♀, L; syn.).
scutatus Rozeboom and Komp.
acharistus Root.—Argentina, Chile. Bram, 1967, 23 (♂*, L*).
alani Forattini.—Colombia.
1965. Entomologica Médica 2: 143 (♂*). Type-loc: Catera a Gachancipa, Colombia (USNM); Bram, 1967, 23 (♂*).
alticola Martini.—Transfer to p. 242 as synonym of *apicinus* Philippi.
annulirostris Skuse.—Delfinado, 1966, 139 (♂*, ♀, L*; syn.).
palmi Baisas.
241. *gambiensis* Theobald.—Insert "; as var." after "(♀)."
242. **apicinus** Philippi.—Bolivia. Bram, 1967, 26 (♂*, ♀, L; syn.).
alticola Martini.
archegus Dyar.—Peru, Colombia, Ecuador. Bram, 1967, 28 (♂*, L; resurrected from syn.). Place before *argenteopunctatus*.
articularis Philippi.—Type-loc: Casa Pangue, Llanquihue, Chile (USNM). Bram, 1967, 30 (♂*; neotype).
243. **azuayus** Levi Castillo.—Transfer to p. 252 as synonym of *nigripalpus* Theobald.
beauperthuyi Anduze.—Transfer to p. 259 as synonym of *saltanensis* Dyar.
bickleyi Forattini.—Colombia.
1965. Entomologia Médica 2: 146 (♂*). Type-loc: Bosque Calderon, Bogota, Colombia (USNM); Bram, 1967, 33 (♂*).
bidens Dyar.—Argentina, Bolivia, Mexico, Venezuela. Bram, 1967, 35 (♂*; resurrected from syn., syn.).
interfor Dyar.

[2] Under Article 31 of the International Code of Zoological Nomenclature this name is presumably not emendable; under the old Code it would have to be changed to *ramakrishnani*, as the species is named after Dr. Ramakrishnan.

244. **brethesi** Dyar.—Bachmann and Casal, 1962, 78 (♂*, P*, L*).
camposi Dyar.—Colombia, Ecuador, Peru. Bram, 1967, 49 (♂*; raised to sp. status).
cheni Ho.—China.
1963. Acta ent. Sinica 12: 368 (♂*, ♀, L*). Type-loc: Canton, China (CMC).
chidesteri Dyar.—Argentina. Bram, 1967, 42 (♂*, L; syn.).
deanei Correa and Ramalho.
confusus Baisas.—Transfer to p. 251 as synonym of *mimulus* Edwards.
245. **coronator** Dyar and Knab.—Bram, 1967, 46 (♂*, L; syn.).
coronator mooseri Vargas and Martinez Palacios.
ousqua Dyar.—Transfer to p. 253 as valid species.
usquatus Dyar.—Transfer to p. 264 as valid species.
usquatissimus Dyar.—Transfer to p. 264 as valid species.
albertoi Anduze.—Transfer to p. 253 as synonym of *ousqua* Dyar.
ssp. **camposi** Dyar.—Transfer to p. 244 as valid species.
ssp. **mooseri** Vargas and Martinez Palacios.—Change to synonym.
covagarciai Forattini.—Venezuela.
1965. Entomologia Médica 2: 128 (♂). Type-loc: San Antonio de Caparo, Municipal Capitol, Venezuela (USNM); Bram, 1967, 53 (♂*, L).
deanei Correa and Ramalho.—Transfer to p. 244 as synonym of *chidesteri* Dyar.
declarator Dyar and Knab.—Bram, 1967, 56 (♂*, L; syn.).
forattinii Correa and Ramalho.
246. *bidens* Dyar.—Transfer to p. 243 as valid species.
247. **fasyi** Baisas.—Change "[Davao], Mindanao" to "[Mountain], Luzon."
fernandezi Casal, García and Cavalieri.—Argentina.
1966. Physis 26: 185 (♂*, ♀, P*, L*). Type-loc: Quebrada de Piquirenda, Salta, Argentina (INM).
forattinii Correa and Ramalho.—Transfer to p. 245 as synonym of *declarator* Dyar and Knab.
248. **gameti** Bailly-Choumara.—Cameroon.
1966. Bull. Soc. Path. exot. 59: 148 (♂*). Type-loc: Mbol, Yokadouma, E. Cameroon (IERT).
249. **habilitator** Dyar and Knab.—Peru.
incognitus Baisas.—Delfinado, 1966, 145 (♂*, ♀, P, L*).
interfor Dyar.—Transfer to p. 243 as synonym of *bidens* Dyar.
250. **kesseli** Belkin.—Belkin, 1964, 236 (♂*, ♀, P*).
lahillei.—Correction to Suppl. II. Change "Casals" to "Casal"; also index, p. 140.
levicastilloi Lane.—Venezuela. Bram, 1967, 74 (♂*, L; syn.).
tejerai Cova Garcia.—1962. Rev. Sanid. Asist. Soc. 27: 312 (♂*, ♀, P*, L*). Type-loc: Near La Cumbre de Choroni, Aragua, Venezuela (DERM).
251. **mimulus** Edwards.—Delfinado, 1966, 150 (♂*, ♀; syn.).
confusus Baisas.
mollis Dyar and Knab.—Bram, 1967, 80 (♂*, L; syn.).
tisseuili Senevet.
252. **nigripalpus** Theobald.—Bram, 1967, 84 (♂*, L; syn.).
azuayus Levi-Castillo.

oswaldoi Forattini.—Brazil.
1965. Entomologia Médica 2: 167 (♂*). Type-loc: Macaphyba, Natal, Brazil (USNM); Bram, 1967, 86 (♂*).

253. **ousqua** Dyar.—Mexico to Colombia. Bram, 1967, 50 (♂*; resurrected from syn.; syn.).
albertoi Anduze.
palmi Baisas.—Transfer to p. 241 as synonym of *annulirostris* Skuse.

254. ssp. **quinquefasciatus** Say.—Restore to this status.
trifurcatus Fabricius.—Delete "*fatigans* ssp."

258. **pseudovishnui** Colless.—Delfinado, 1966, 147 (P, L*).
quinquefasciatus Say.—Return to p. 254 as ssp. (see Suppl. II).

259. **salinus** Baisas.—Transfer to p. 260 as synonym of *sitiens* Wiedemann.
saltanensis Dyar.—Brazil, Panama, Venezuela. Bram, 1967, 97 (♂*, L; syn.).
beauperthuyi Anduze.
scutatus Rozeboom and Komp.—Transfer to p. 242 as synonym of *abnormalis* Lane.
sitiens Wiedemann.—Delfinado, 1966, 151 (♂*, ♀, L*; syn.).
salinus Baisas.

260. **spinosus** Lutz.—Colombia, Venezuela.

261. **suborientalis** Baisas.—Change "[Davao], Mindanao" to "[Mountain], Luzon."

262. **thriambus** Dyar.—Dominican Republic, Costa Rica, Colombia.
tisseuilli Senevet.—Emended by Belkin, 1965, 24 to *tisseuili*. Transfer to p. 251 as synonym of *mollis* Dyar and Knab.

263. *siamensis* Barraud and Christophers.—Insert "; as var." after "♂."

264. **usquatissimus** Dyar.—Costa Rica to Ecuador and British Guiana. Bram, 1967, 51 (♂*; resurrected from synonymy).
usquatus Dyar.—Mexico to Argentina. Bram, 1967, 49 (♂*).

Subgenus MELANOCONION Theobald

266. *ocossa* Dyar and Knab.—Change "Surinam" to "British Guiana."

268. **clarki** Evans.—Argentina. Casal, 1963, 317 (♂*; resurrected from syn.).

269. **eastor** Dyar.—Trinidad.

271. **implicatus** Senevet and Abonnenc.—Transfer to p. 273 as synonym of *nigrescens*.

273. **nigrescens** (Theobald).—Casal, 1963, 317 (♂*).
implicatus Senevet and Abonnenc.
clarki Evans.—Transfer to p. 268 as valid species.
oedipus Root.—García and Casal, 1965, 9 (P*).

274. **portesi** Senevet and Abonnenc.—French Guiana, Trinidad, Brazil. Aitken and Galindo, 1966, 202 (♂*, ♀; resurrected).
cayennensis Floch and Abonnenc.

275. **rabanicolus** Floch and Abonnenc.—Change to **rabanicola**.

276. *portesi* Cenevet and Abonnenc.—Transfer to p. 274 as valid species.
cayennensis Floch and Abonnenc.—Change "PIG" to "NE"; transfer to p. 274 as synonym of *portesi*.
ybarmis Dyar.—Trinidad.
zeteki Dyar.—Trinidad.

Subgenus MICROCULEX Theobald

278. *Important reference:* 1962, Coutinho and Forattini, 209-234.

279. **intermedius** Lane and Whitman.—Coutinho and Forattini, 1962, 217 (♂*, ♀, P*, L*).

280. **lanei** Coutinho and Forattini.—Brazil.
1962. Studia ent. 5: 210 (♂*, ♀, P*, L*). Type-loc: Bertioga (Itaguaré), Santos, São Paulo, Brazil (FH).

pleuristriatus Theobald.—Coutinho and Forattini, 1962, 223 (♂*, P*, L*).

shopei Forattini and Toda.—Brazil.
1966. Studia ent. 9: 507 (♂*, ♀*, P*, L*). Type-loc: Utinga, Belem, Para, Brazil (FH).

xenophobus Ronderos.—Venezuela.
1965. Physis 25: 249 (♂*, ♀*, P*, L*). Type-loc: San Bonifacio, Sucre, Venezuela (INM).

Subgenus AEDINUS Bourroul

281. **americanus** (Neveu-Lemaire).—Transfer to p. 283 as a *nomen dubium*. Change French Guiana to Brazil.

bisculatus Coquillett.—Trinidad, Antilles. Transfer to follow *belemensis* as a valid species with *antillum-magnorum* of authors as a synonym.

canaanensis Lane and Whitman.—Change "1934" to "1943."

cauchensis Floch and Abonnenc.—Change "Moyenne-Mana" to "Caux."

Subgenus CARROLLIA Lutz

282. **bihaicolus** Dyar and Nuñez Tovar.—Change to **bihaicola**.

Nomina Dubia

283. **americanus** (Neveu-Lemaire).—French Guiana. Fauran, 1961, 45 (taxon.).

Genus DEINOCERITES Theobald

285. **pseudes** Dyar and Knab.—Texas.

Fossil Species

286. **loewi** Giebel.—Place "Giebel" in parentheses; change "**Culex**" to "**Toxorhynchites**"; insert "*Culex*" after "A"; change "LU" to "NMC."

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Aken (Supplement II.) Change "onderzbek" to "onderzoek."

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Type Depositories

327. ANIC. Australian National Insect Collection, Canberra, Australia.
BNI. Barnhard-Nocht-Instituts für Schiffs- und Tropenkrankheiten, Hamburg, Germany.
CMC. Department of Parasitology, Chungshan Medical College, Canton.
DERM. Laboratorio de Entomologíade de la División de Endemias Rurales, Maracay, Venezuela.
329. NCID. National Institute of Communicable Diseases, Delhi, India.
NMC. Naturwissenschaftlichen Museum der Coburger Landestiftung, Coburg, Germany.
Australia (ANIC).
330. China (CMC, SMC), Germany (BNC, NMC), India (NICD), Venezuela (DERM).

Index

336. cephasi.—Change to *cephasi*.
338. decannus.—Change to deccanus.
344. *josephinae*.—Change to josephineae.
karwari (Barraud).—Change to karwari.
347. *miachaetessus*.—Change to *miachaetessa*.
351. pennai.—Change 151 to 150.
353. *reptans* Linnaeus. Change "Mon-mosquito" to "Non-mosquito."
354. *scutipunctatus*.—Change "Neivan" to "Neiva."
shintiensis.—Change "Lein" to "Lien."
355. stokesi.—Change 196 to 197.

Index to Supplement III

This includes only those names not indexed in the original catalog or in Supplements I and II. The page numbers here refer to the number at the left in the preceding text, quivalent to the proper position in the original catalog.

REPLACEMENT NAMES FOR PREOCCUPIED SPECIFIC NAMES IN DOLICHOPODIDAE

(Diptera)

Medetera postminima nomen novum for *Medetera minima* Van Duzee, 1925, Psyche 32: 180 (California, U.S.A.), not *Medetera minima* (as *Medeterus minimus*) De Meijere, 1916, Tijd. Ent. 59: 259 (Java); also recorded from Sumatra by Hollis, 1964, Beaufortia 10: 260.

Sympycnus pessimplex nomen novum for *Sympycnus simplicipes* De Meijere, 1916, Tijd. v. Ent. 59: 252 (Java), not *Sympycnus simplicipes* Becker, 1908, Mitteil. Zool. Mus. Berlin 4: 46 (Canary Islands, Europe). This species has recently been recorded from Sumatra by Hollis, 1964, Beaufortia 10: 269, under the De Meijere name.—George C. Steyskal, *Entomology Research Division, ARS, U.S. Department of Agriculture, Washington, D.C. 20560.*

SOME NEW AND OLD SPECIES OF COLASPIS IN THE WEST INDIES

DORIS H. BLAKE, *Department of Entomology, Smithsonian Institution, Washington, D.C. 20560*

This paper is an attempt to straighten out the names of the blue or green species of *Colaspis* found in the West Indies as well as to describe several new species collected there. These rather large conspicuous beetles are of strikingly brilliant blue or green color, sometimes shot with rosy or golden lights, and so have attracted the attention of entomologists from the early days. Linnaeus described the first species from "America" in 1758, quite simply as "green with yellow legs and antennae", and named it *Chrysomela occidentalis*. The name has been applied to a Jamaican species but the beetle was collected by Rolander, who, according to Henrikson (1928, Ent. Med. 15:97) collected not in Jamaica but in Surinam (Dutch Guiana). Later Linnaeus described another species that he named *Cryptocephalus jamaicensis*. This species his pupil, Fabricius, had already described a few years earlier in 1781 as *Erotylus flavipes* from Jamaica and his name takes precedence over Linnaeus' *jamaicensis*. In 1792 Fabricius described *Chrysomela luteicornis* from the islands of "America meridionalis" and Olivier in 1808 described *Colaspis unicolor* and *C. femoralis* from the "Antilles" as well as *Colaspis smaragdula* from Santo Domingo. Since there is great similarity between these blue or green species of *Colaspis*, it is difficult to identify them from their brief old Latin descriptions except by the locality in which they were taken, and when the locality is simply "Antilles", identification can only be made certain by extant specimens of the original beetles. A few old Fabrician specimens are still left; one, *C. luteicornis*, is at Kiel, and some day someone may identify it. I am unable to identify the Olivier species *C. unicolor* or *femoralis*, or *C. nigricornis* Suffrian (changed by Weise to *C. suffriana*) or *varicornis* Suffrian, both from Cuba. All four species are described as having dark or partly dark antennae, and this character does not fit the blue green species of *Colaspis* from the West Indies except an undescribed one from Jamaica.

Lefèvre's description of *C. chevrolati* from Hispaniola and *C. insidiosa* from the "Antilles" are likewise difficult to interpret. F. Monrós spent a year studying the collections in France, and took many of his beetles there for comparison. Since I know that Monrós examined Lefèvre's collection I have taken the specimen that he labelled as *C. chevrolati* as probably correct. It is close to Olivier's *C. smaragdula*.

In the material studied I have found six species from Cuba, three species from Hispaniola, and two species from Jamaica, of these blue or green *Colaspis*. A single specimen has been collected in Puerto Rico, according to G. N. Wolcott, who described it briefly as "an

elongate brownish beetle with light green iridescence most marked on pronotum and head". It was collected on "weeds in a clearing on El Yunque". No one has been able to locate the specimen in the collections in Puerto Rico, and it may possibly represent a new species. On the other hand, on the islands between Puerto Rico and South America there is a species of *Colaspis* which is a brownish beetle with faint green lustre that has been collected on the mainland of South America and also on the islands of St. Vincent and Grenada. It corresponds with Lefèvre's description of *C. insidiosa* from the "Antilles" pretty closely and it may be that this occurs as far north as Puerto Rico. Wolcott's brief description of the color of the Puerto Rico specimen matches the description of the color of *C. insidiosa* Lefèvre.

One other species of *Colaspis* has recently been collected on St. Lucia by O. S. Flint. It is almost piceous with a faint green or blue tint in the dried specimen and has pale yellow brown legs with the tarsi blue green.

Colaspis cubensis, n. sp.
Fig. 1

Between 6 and 7.5 mm. in length, oblong oval, very shiny, metallic green, rarely with a bluish lustre, coarsely and on the elytra geminately striate punctate, the intervals being slightly costate, legs and antennae yellowish brown.

Head coarsely and rugosely punctate, a more or less distinct median line down occiput; shiny, brilliant green, with labrum and mouthparts yellowish brown. Antennae yellowish brown with tip of terminal joint dark piceous, very slender, extending to about middle of elytra. Prothorax with slightly angulate sides with a more or less distinct angle at about the middle, and a tooth at apical and basal angles, surface coarsely and somewhat irregularly punctate, with bare places, not very convex, brassy green. Scutellum small, shining green. Elytra coarsely and geminately striate punctate, the rows near apex becoming single and intervals on sides and at apex more costate, brilliant green, only occasionally bluish green. Body beneath shining green, legs pale yellowish brown, in male first tarsal joint of middle and anterior legs a little widened but not swollen as in other species. Length 6–7.5 mm.; width 3–4.2 mm.

Type, male, and 8 paratypes, USNM 68322.

Type locality.—Cayamas, Cuba, collected by E. A. Schwarz.

Other localities.—Cuba: vicinity of Havana, T. Barbour; Havana, Baker; Santiago de las Vegas, on *Solanum melongeum*, P. Cardin; San Antonio de los Banos, Jose H. Pazos; Alquiza, on *Solanum corvum*, L. Scaramuzza; Jaronu, on eggplant, L. Scaramuzza; Santa Clara, R. Combs; Baragua, on eggplant, L. Scaramuzza; Nagua, Oriente Prov., S. C. Bruner; C. H. Ballou; San Blas, Santa Clara; Bahia Honda, Wickham; Soledad, Cienfuegos, P. J. Darlington, Jr. Loma del Gato, Cobra Range, about 3000 ft. alt., P. J. Darlington, Jr.; Banos de San Vicente, Pinar del Rio, C. Parsons; Buenos Aires, Trinidad Mts., C. Parsons;

Upper Yana Valley, L. Scaramuzza; Vinales, Pinar del Rio, W. J. Clench, P. Vaurie.

Remarks.—This Cuban species has always been called *C. smaragdula* Oliv. ever since Suffrian identified it as that, but *smaragdula* was described from "St. Domingo" and the present species is confined to Cuba. It is distinguished from the species from Hispaniola in having costate elytra, and is distinguished from other species of *Colaspis* from the West Indies by its proportionately shorter prothorax, more geminately striate punctate elytra, less swollen first tarsal joint in the male, and by the broadly rounded apex to the aedeagus that has only a very short blunt tip.

Colaspis alcyonea Suffrian
Fig. 13

Colaspis alcyonea Suffrian, Archiv. f. Naturg., vol. 32, 1866, p. 326.

About 7 mm. in length, oblong oval, pronotum alutaceous, densely and deeply punctate with rounded sides, elytra shiny, densely, deeply and substriately punctate, without costae, dark blue green, blue or even purplish, legs and antennae yellow brown.

Head densely and coarsely punctate with a depression in middle of front, dark blue green or even purplish blue, mouthparts yellowish brown. Antennae extending almost to middle of elytra, yellow brown. Prothorax with rounded sides, surface alutaceous and not at all shiny, punctures deep, moderately coarse and dense. Scutellum dark. Elytra shiny, punctures deep, moderately coarse and dense. Elytra more shiny than pronotum with dense, coarse punctation tending to be striate and with some horizontal ridging, a little costate at apex. Body beneath shining blue or green, legs yellow brown, first tarsal joint of front and middle legs rotund in male. Length 6.5–7.3 mm.; width 3–3.6 mm.

Type, whereabouts unknown.

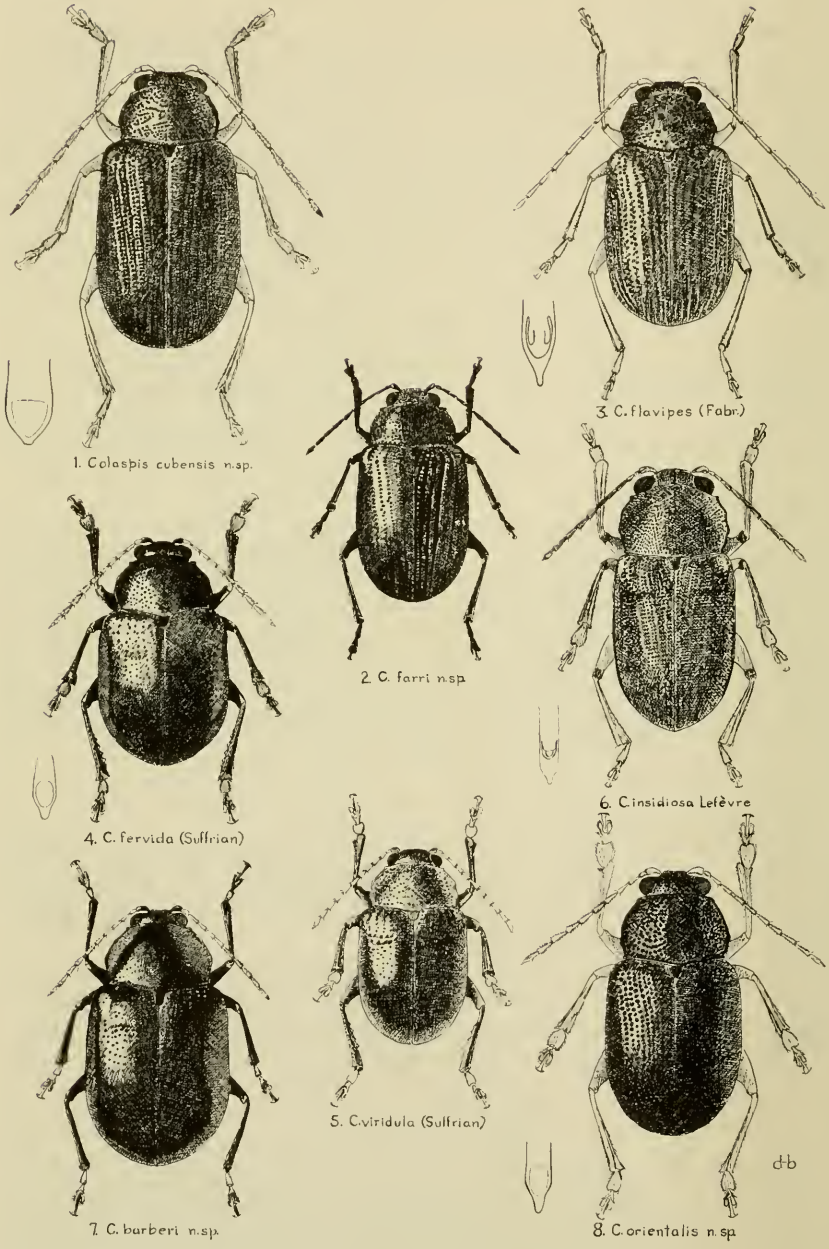
Type locality.—Cuba.

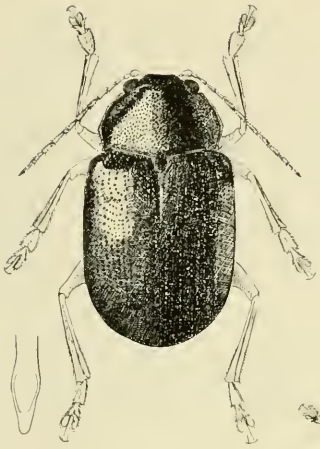
Other localities.—Cuba: Havana, Barbour; Buenos Aires and Mina Carlota, Trinidad Mts., C. Parsons, June and July 1939; Buenos Aires, P. J. Darlington, Jr., May 1936, at 2500–3500 ft. alt.; Soledad, Cienfuegos, May 1936, P. J. Darlington, Jr.

Remarks.—The deep blue or even purple coloring as well as the dense elytral punctation and lack of costae distinguish this from *C. cubensis*. The first tarsal joint of the male is rounded and wider than in *C. cubensis*. The aedeagus has an unusually long narrow tip.

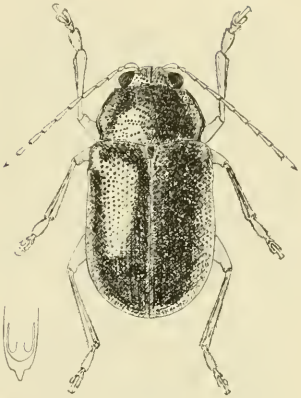
Colaspis orientalis, n. sp.
Fig. 8

About 6.5 mm. in length, oblong oval, prothorax distinctly alutaceous and not shiny, elytra finely alutaceous but somewhat more shiny, prothorax deeply, densely and coarsely punctate, not very convex with rounded, not at all angulate sides, elytra coarsely and substriately punctate, without costate intervals, green, legs and antennae yellowish brown, in male the first tarsal joint of all legs wide.

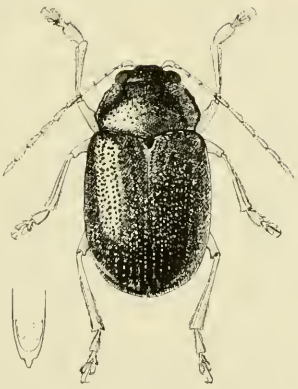

1. Colaspis cubensis n.sp.
2. C. farri n.sp.
3. C. flavipes (Fabr.)
4. C. fervida (Suffrian)
5. C. viridula (Suffrian)
6. C. insidiosa Lefèvre
7. C. barberi n.sp.
8. C. orientalis n.sp.
d-b



9 Caluspis darlingtoni n.sp.



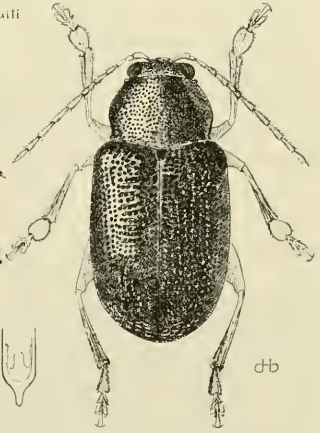
11. C. smaragdula Oliv. Guaymate, D.R.



10. C. smaragdula Oliv. Source, Haiti

12. C. chevrolati Lefèvre (Montros del.) Port au Prince Haiti

13. C. luciae n.sp.



14. C. alcyoneus Suffrian

Head coarsely and densely punctate, an obscure median line down occiput, surface dull, not shiny, dark green with the labrum and mouthparts deep reddish brown. Antennae not extending below middle of elytra, slender, yellow brown. Prothorax with rounded sides, not angulate, a tooth at basal and apical angles, surface alutaceous, not at all shiny, with dense, deep, and coarse punctures and in intervals very fine punctures, dark green. Scutellum dark green. Elytra a little wider than prothorax, slightly alutaceous, but more shiny than prothorax, with regular coarse and nearly striate punctures, without costae except for a slight trace at apex, deep green. Body beneath shiny dark green, legs yellow brown; in the male the anterior and middle first tarsal joint rotund and the corresponding joint in hind feet nearly as well rounded. Length 6–6.5 mm.; width 3–3.1 mm.

Type, male, MCZ 31203.

Type locality.—Soledad, Cienfuegos, Aug. 1920, N. Banks.

Other locality.—Baracoa, Oriente Province, Cuba, collected by S. C. Bruner and Leon Boucle, April 21–30, 1929.

Remarks.—The dull dark green surface of the prothorax and lack of elytral costation distinguish this from *C. cubensis.* It is very closely related to *C. alcyonea* Suffrian, which has similar elytral punctation but is more shiny and usually is blue or even purplish whereas this species is a dark green. The two species are difficult to separate except by comparison of the aedeagi. The aedeagus is wider and with a more slender tip in *alcyonea.* Only two specimens, both males, of this species are known, but in the two the aedeagi are alike and distinctly different from *alcyonea.*

Colaspis fervida (Suffrian)
Fig. 4

Chalcophana fervida Suffrian, 1866, Archiv. f. Naturg. 32:330.

Between 5 and 6 mm. in length, broadly oblong oval, lustrous green, elytra shining with golden and rosy lights, antennae and tarsal joints pale yellowish brown; prothorax with traces of angularity at sides and with scattered punctures denser on sides, elytra without costae, punctures substriate, not dense or coarse.

Head usually with a slight median depression on occiput, otherwise smoothly polished and rather densely punctate, lustrous green with brown mouthparts. Antennae extending below humeri, yellow brown with the basal joint metallic green. Prothorax moderately convex with traces of angularity on sides, a strong apical tooth and smaller basal one, surface polished, lustrous green with scattered punctures, denser on sides and not coarse. Scutellum polished green. Elytra moderately convex, with small humeri and a faint trace of tranverse depression below, no signs of costate intervals, small substriate punctation, surface polished, shining with a golden or rosy sheen. Body beneath green, prosternum densely punctate, legs green except the pale yellow brown tarsal joints, sometimes these having a greenish lustre, in male inner side of hind tibiae serrate, first tarsal joint of anterior pairs of legs well rounded. Length 5–6 mm.; width 3–3.6 mm.

Type, whereabouts unknown.

Type locality.—Cuba.

Other localities.—Habana, Baker; Cayamas, Schwarz.

Remarks.—The rosy and golden lights of the polished green elytra make this species easily recognizable. It has much the same polished surface as *C. smaragdula* Oliv. from Hispaniola, but is a shorter, broader and more rounded beetle. This is one of three species of *Colaspis*, all of which occur in Cuba, that are shorter and more rotund than the other species of blue-green *Colaspis* from the West Indies. These three species bear a strong resemblance to all the species found in Hispaniola in having polished elytra with scattered and not very dense punctation and in being without costae. In all of them the sides of the prothorax show more or less degrees of angulation in spite of Suffrian's statement that the sides are rounded. There is one peculiarity in the males of the group that the inner side of the hind tibiae is serrate.

Colaspis viridula (Suffrian)
Fig. 5

Chalcophana viridula Suffrian, 1866, Archiv. f. Naturg. 32:331.

About 4 mm. in length, oblong oval, lustrous green with pale yellow antennae and tarsal joints; prothorax with scattered punctures, elytra with substriate and not dense or coarse punctation, a transverse depression below basal callosity, no trace of costae.

Head with a slight median depression on occiput, front without depressions, and with scattered, not dense or coarse, punctation; mouthparts dark brown. Antennae with basal joint having a faint metallic lustre, rest pale yellow except for a dark tip to terminal joint. Prothorax somewhat convex, with rounded sides, a trace of angulation along sides, a pronounced apical tooth and small basal one; surface polished green with scattered punctures, denser on sides, nowhere coarse. Scutellum shining green. Elytra without trace of costae, a tranverse depression below basal callosities, punctation tending to be striate, not coarse or dense. Body beneath shining green, prosternum densely punctate, legs green, tarsal joints yellowish brown with faint greenish lustre; hind tibiae in male with serrate edge on inner side and first tarsal joints of anterior pairs of legs much rounded. Length 4.2 mm.; width 2.6 mm.

Type, whereabouts unknown.

Type locality.—Cuba.

Remarks.—A single specimen from Loma del Gato, Sierra del Cobre, elevation 2600–3325 ft., Oriente Province, Cuba, was collected in September 1935 by J. Acuña, S. C. Bruner and L. Scaramuzza which seems to fit Suffrian's description of *Chalcophana viridula*. Suffrian wrote that it was smaller than *C. fervida* but very similar. It lacks the golden sheen of *fervida* being simply polished green. The coloring otherwise is much the same, and the serration on the hind tibiae in the male is the same.

Colaspis barberi, n. sp.
Fig. 7

About 5.5 mm. in length, oval, shining, the prothorax and head lightly and elytra more coarsely punctate, deep violaceous blue shining with greenish lights, tarsi and antennal joints except the basal one yellowish brown.

Head with a faint trace of median depression on occiput, otherwise without depressions, polished, distinctly and not densely punctate, brilliant blue or purple with green lights; mouthparts brown. Antennae extending a little below humeri, slender, outer joints a little broader, basal joint with metallic blue lustre and tip of terminal joint dark, otherwise yellowish brown. Prothorax convex with sides rounded in one specimen and with a trace of angularity in other specimen, a tooth at basal and apical angles; surface brilliant dark blue with purplish or greenish lights, distinctly and not coarsely or densely punctate. Scutellum shining dark blue. Elytra broad and moderately convex, polished dark blue with purplish or greenish lustre, and with coarse and not dense punctation that tends to be irregularly striate, a slight depression below basal callosity. Body beneath shining dark blue, almost glabrous, legs dark blue with tibiae slightly hairy at apex, and tarsal joints a yellowish brown with faint metallic green lustre. Length 5.5 mm.; width 3.3 mm.

Type, female, and one female paratype, USNM 68321.

Type locality.—Taken on "Musail cayes" at Baragua, Cuba, Nov. 5, 1926 by L. Scaramuzza.

Remarks.—This is distinguished from *C. fervida* Suffrian by its deep purplish blue coloring and by the finer and not so densely punctate pronotum. No male of the species is known, so it is impossible to say whether there is serration on the hind tibiae, but it is likely since this is closely related to the group of species with that character, composed of *C. fervida* (Suffrian) and *C. viridula* (Suffrian). H. S. Barber had labelled this as a new species and set it aside to describe. Suffrian's description of *C. striata* differs from this species in its smaller size, in the dark coloring of the tarsi, and in the striate punctation of the elytra.

Colaspis smaragdula Olivier
Figs. 10, 11

Colaspis smaragdula Olivier, 1808, Entomologie 6:883.

Olivier's description translated is as follows: *Colaspis smaragdula*, punctate, green, antennae and feet rufous, punctures of elytra substriate. Magnitude and form of *C. aurata*. Antennae pale rufous. Head punctate, green, eyes fuscous. Thorax punctate, green. Scutellum green. Elytra green with substriate punctures. Body green. Feet rufous. It has a gilded appearance. The antennae are of a pale yellowish brown, eyes are brown. All the body is of a beautiful brilliant green color, the head and thorax are punctate, the elytra are punctate, the punctures form almost geminate striae. The feet are yellowish brown. It is found in Santo Domingo.

This short description easily fits all the *Colaspis* found on Hispaniola, as well as many elsewhere, and has led to the old Olivier name being applied pretty generally to most of the species with green coloration in the West Indies since Suffrian applied it to the Cuban species. However the habitat limits the species to Hispaniola. All the *Colaspis* that I have examined from Hispaniola are alike in being a brilliant polished green, without costae, except for traces near the apex, and with the punctures of the prothorax and elytra not very dense or coarse, and the elytral punctures tend to be striate or even geminate striate. Yet the aedeagi of these polished green beetles show considerable variation. In some specimens from the mountains of the central part of the Dominican Republic the aedeagi are totally different. The beetles themselves are larger with a larger prothorax. Since these beetles were collected in an inaccessible country in the interior, it is not so likely that this is the Olivier species and I am describing it as new. From the rest of the beetles I am illustrating two specimens with somewhat different aedeagi. One figure is of a specimen from Guaymate, in the southeastern part of the Dominican Republic. The second figure is of a specimen from Source, Metalas, Haiti, which is in the low coastal region between Port-au-Prince and Ennery. Whether this variation in the aedeagi is subspecific I cannot determine as I have far too little material from which to form any conclusion.

Colaspis chevrolati Lefèvre fide F. Monrós
Fig. 12

Colaspis chevrolati Lefèvre, 1891, Ann. Soc. Ent. Belg. 35:CCLVII.

Lefèvre's description of *Colaspis chevrolati* translated is as follows: *Colaspis chevrolati,* suboblong ovate, convex, metallic green, with blue tints, shining, labrum, palpi, antennae and feet bright fulvous. Length 6½–7 mm. St. Domingo. Head strongly and not densely punctate, between eyes a short longitudinal impression. Prothorax transverse with arcuate sides and in middle obsoletely sinuate, convex above, in middle of disc rather distantly and on sides more densely punctate with elongate (aciculatim) punctures. Scutellum smooth, apex subrotund. Elytra below humeri obsoletely transversely impressed, unevenly punctate, towards apex and especially near suture with substriate punctation, humeral callosity moderately rounded, smooth. This pretty species comes from Chevrolat's collection where it was confused with *C. smaragdula* Oliv. of the same country. It resembles it in color but in form and punctation is very different.

In the Monrós collection are two specimens from Port-au-Prince, Haiti, that F. Monrós has identified as *chevrolati* Lefèvre. Monrós spent a year in Paris studying collections there and may have compared material with Lefèvre types. The figure of the male herewith given has an aedeagus that differs only slightly from that of other specimens of the genus in Hispaniola.

Colaspis darlingtoni, n. sp.
Fig. 9

About 6.5 mm. in length, oblong oval, shining, prothorax and elytra distinctly but not coarsely nor densely punctate, punctures on elytra tending to be geminate striate; green or bluish green with antennae and legs yellowish brown.

Head coarsely and densely punctate with an obscure median line down occiput, very shiny green with mouthparts dark reddish brown. Antennae not extending to middle of the elytra, slender, pale yellow brown with tip of terminal joint dark. Prothorax moderately convex with sides feebly angulate, especially a little below the middle, a tooth at basal and apical angles; surface shining with moderately dense, deep but not coarse punctures, green or bluish green. Scutellum shining blue or green. Elytra with a slight basal callosity and a depression below this in which punctures are a little coarser than on callosity, punctation irregularly geminate striate, not very dense or coarse, without ridging between except feeble traces of costae at apex; green or bluish green. Body beneath shining blue or green or even with a purplish tinge, legs yellowish brown, first tarsal joint in anterior and middle legs roundly widened. Length 6.1–6.7 mm.; width 3.3–3.7 mm.

Type, male and 2 paratypes, MCZ 31204. One paratype in the U.S. National Museum.

Type locality.—Foothills of the Cordillera Central, south of Santiago, Dominican Republic, June 1938, P. J. Darlington, Jr.

Other locality.—Constanza, 3000–4000 ft., August 1938; 25 miles by road south of Puerto Plata, June 1938, P. J. Darlington, Jr.

Remarks.—While the description of *Colaspis smaragdula* Olivier fits this species also, it does not appear so likely to be Olivier's species because it was taken in the mountains in the middle of the Dominican Republic in inaccessible country, where P. J. Darlington with his usual perspicacity found it. The aedeagus of this species is utterly unlike that of any of the rest of the species of the island.

Colaspis flavipes (Fabricius)
Fig. 3

Erotylus flavipes Fabricius, 1781, Spec. Ins. 1:159.
Cryptocephalus jamaicensis Gemelin ed. Linnaeus Systema Naturae, vol. 4, 1788, p. 1729.
Colaspis flavipes Olivier, 1801, Entomologie 6:881. (Probably not the same as Fabricius' species as Olivier gives the locality as French Guiana.)

Between 6 and 8 mm. in length, oblong oval, lustrous green, blue green or sometimes brown with greenish lustre in the punctures or faintly green along margins, occasionally entirely brown. Legs and antennae pale yellow brown; coarsely punctate, punctures on elytra in single striate lines near suture, becoming semi-geminate from 5th row to side with little smooth space between lines of punctures on sides.

Head at base of occiput finely punctate, punctures becoming coarser towards frontal tubercles which are impunctate, a depression in middle of front, labrum pale yellow brown. Antennae long and slender, pale yellow brown. Prothorax not twice as wide as long, rather flat, sides angulate at middle, with small tooth

at basal and apical angles; punctures irregular, not so dense in middle, contiguous on sides. Scutellum lustrous, impunctate. Elytra with short intra-humeral sulcus, a depression below scutellum in which coarse striate punctures are sunken; four rows of striate punctures from suture to middle of each elytron, more or less evenly striate with smooth spaces between rows, thence rows of striate punctures becoming more geminate with intervening space less and more costate, on sides and at apex distinctly costate; lustrous green or in some specimens brown with green in punctures, occasionally entirely brown. Body beneath lustrous green or brown, impunctate except on prosternum, legs entirely yellow brown. Length 5.7–8.3 mm.; width 3–4 mm.

Type possibly in British Museum (Natural History), "Museum D. Banks".

Type locality.—Jamaica.

Other localities.—Manchester Parish, Mandeville, collected by Van Dyke; on Elephant's ear and Susumbra, collected by J. M. Dale, 20 June 1950; St. Thomas Parish, 1 mile east of Lyssons, May 28, 1954, T. H. Farr; Corn Puss Gap, on Susumbra, Oct. 1, 1950, R. P. Bengry; Bath, 1937, Chapin and Blackwelder; St. Ann's Parish; Monoagre, H. Morrison, Sept. 14, 1917; Mt. Diablo, June 13, 1965, T. H. Farr; Trelawny Parish, Windsor Estate, T. H. Farr, March 1960, R. P. Bengry, Aug. 30, 1955; Cockpit City, J. Maldonado, Dec. 28, 1961; Hope Gardens near Kingston, May 23, 1921, C. C. Gowdey; Kingston, near Liguana, on wild solanaceous plant, M. Kisluik, June 7, 1931.

Remarks.—At first the entirely brown coloring of some specimens seemed to indicate a different species from *C. flavipes*, but further study of a series of specimens taken at one time by T. H. Farr at Mt. Diablo left no doubt that the species varies from lustrous bright green to entirely brown. The brown specimens have been taken in certain inland areas of Jamaica in Trelawny Parish and St. Ann's Parish.

Since this is the only blue-green *Colaspis* that occurs in Jamaica there is little doubt that the Fabrician name must be applied to it.

Colaspis farri, n. sp.
Fig. 2

About 5.5 mm. in length, oblong oval, lustrous dark blue with a bluish green lustre about elytral striate punctation; rugosely punctate on prothorax, lines of moderately coarse punctures on elytra, antennae and legs dark.

Head with interocular space approximately half width of head, densely punctate throughout with a trace of median depression, shining blue green, labrum and mouthparts dark brown. Antennae extending below humeri, basal joints with a metallic bluish lustre, remainder dark brown. Prothorax slightly angulate at middle on sides with a tooth at apical angle and a less marked one at base, surface rugose with deepset and not too dense punctation, dark blue with purplish and greenish lustre. Scutellum dark, polished, impunctate. Elytra with regular rows of moderately coarse punctures, these rows having a blue or green lustre against the dark blue intervals, intervals towards apex becoming costate. Body

beneath dark with a bluish or greenish lustre, legs also dark. Length 5.5 mm.; width 2.9 mm.

Type, female, USNM 68320.

Type locality.—Grove Place, Manchester Parish, Jamaica, collected 23 June 1960 by T. H. Farr.

Remarks.—The small size and deep dark blue color distinguish this species. All the others treated in this paper have pale yellow legs or at least the tarsal joints are pale, and the antennae pale. This species alone has entirely dark legs and dark antennae.

Colaspis insidiosa Lefèvre
Fig. 6

Colaspis insidiosa Lefèvre, Ann. Ent. Soc. Fr. (5) VII, 1877, p. 145.

Lefèvre's description of *Colaspis insidiosa* translated is as follows: *Colaspis insidiosa,* oblong ovate, fuscous aeneous, shining, body below sparsely pubescent, margins of prothorax and elytra obscurely green, labrum, antennae and legs rufous brown; head densely punctate, between eyes with a longitudinal impression, eyes large, dark, prothorax convex, unequally punctate with very minute, scarcely visible punctures in the interstices, sides with reflexed margins, rounded and widened at middle with obsolete bidentate edge; scutellum smooth, rounded at apex, elytra below base transversely strongly impressed, with prominent humeri, that are smooth. Male, smaller, elytra towards suture quite regularly subgeminate punctate, near sides more strongly and less regularly subrugose punctate, first joint strongly dilated in anterior tarsi. Length 7½–8 mm.; latitude 3½ mm. Female, longer and wider, elytra on interior disc regularly striately subgeminate punctate, towards apex and near suture quite profoundly punctate sulcate, interstices convex, smooth, near sides strongly costate, interstices tranversely rugose, first tarsal joint of anterior legs triangular.

Type locality.—"Antilles".

Other localities.—Venezuela: Caracas; *Grenada*: St. George (Leeward side), H. H. Smith, Becquia, H. H. Smith. *St. Vincent*: Yambu River Valley, on guava, M. Kisluik, C. E. Cooley; on cotton, W. N. Sands and H. A. Ballou. Mistique, on cotton leaves, W. H. Sands.

Remarks.—Although this beetle was identified in the Bowditch collection as *Colaspis fastidiosa* Lefèvre, I believe that it is rather *Colaspis insidiosa* Lefèvre, the habitat of which is given as the "Antilles". Lefèvre's description of a brown beetle with greenish margins, and with geminate striate punctures on the elytra fits this beetle and likewise his description of the rugose punctation and costae on the sides of the female applies to it. In the shape of the large prothorax it is unlike any other blue green *Colaspis* from the West Indies.

Colaspis luciae, n. sp.
Fig. 13

About 4.5 mm. in length, oblong oval, shining, almost piceous with a faint bluish green tint (when boiled to relax, beetle was distinctly dark bluish green), antennae

yellowish brown with last four joints darker brown; legs pale yellowish brown with tarsal joints bluish green; pronotum not so coarsely punctate as elytra, in which punctation in basal half is confused, becoming striate in apical half.

Head with interocular space more than half width of head, coarsely punctate over entire head, punctures larger in lower front, a slight median depressed line down front. Antennae extending to middle of elytra, pale yellow brown with four apical joints dark brown. Prothorax with two angularities in middle of sides, and a tooth at each angle, densely and coarsely punctate. Scutellum small, rounded. Elytra with shining impunctate humeral prominences, otherwise coarsely, contiguously and confusedly punctate in basal half, the punctures being coarser than those on pronotum, and becoming striate in apical half with the intervals slightly costate. Body beneath dark bluish green, smooth with only the sides of prosternum punctate. Legs yellowish brown with tarsal joints bluish green, first joint in front and middle tarsi enlarged in male. Length 4.5 mm.; width 2.5 mm.

Type, male, USNM 69217.

Type locality.—Marisule, St. Lucia, 30 July 1963, O. S. Flint.

Remarks.—*C. femoralis* Olivier and *C. unicolor* Olivier, both from the "Antilles", are described as bronzy, the latter even a little coppery, with antennae fuscous except at base. These descriptions do not apply to this species. There is no bronzy or coppery lustre at all to this beetle. It is almost black with a very faint blue green tint that may be more pronounced in the living beetle as it was distinctly dark blue green when boiled. It is smaller than most of the blue green species and the yellow brown legs have the tarsal joints blue green, unlike any other species from the West Indies.

A SUBSTITUTE NAME FOR THE GENUS NICUESA IN COCKROACHES
(DICTYOPTERA, BLATTARIA, BLATTELLIDAE)

In 1929 Hebard (Trans. Amer. Ent. Soc. 55: 397) described the genus *Nicuesa*, based on *N. dichroa* Hebard from Panama. It is preoccupied by *Nicuesa* Distant 1893 (Biol. Centr. Amer., Heteroptera 1 (Suppl.): 385) in Lygaeidae. Slater 1964 (Cat. Lygaeidae World, 1: 151) recognizes *Nicuesa* Distant as valid. No other name is available for *Nicuesa* Hebard, according to Princis 1965 (Orthopterorum Cat., Pars. 7: 392). Furthermore, Dr. K. Princis (Univ. Lund), *in litt.* 1967, agrees with the unavailability of a name. Therefore, I here propose *Drabeha*, new name, to replace *Nicuesa* Hebard. The name of the type species is *Drabeha dichroa* (Hebard), new combination. *Drabeha* is modified from the anagram of the name Hebard, as a tribute to my late friend Morgan Hebard for his many basic researches in the Blattaria. ASHLEY B. GURNEY, *Entomology Research Division, ARS, U. S. Department of Agriculture.*

A NEW THYCE FROM GEORGIA
(COLEOPTERA: SCARABAEIDAE)

O. L. CARTWRIGHT, *Curator of Coleoptera, Department of Entomology, U.S. National Museum, Washington, D.C. 20560*

This is the first species of the genus *Thyce* to be recorded from eastern United States, all others being from California, New Mexico, and Texas. It was first submitted for determination by Dr. Max R. Osburn of the U.S. Department of Agriculture pecan laboratory at Albany, Georgia, who also obtained all the additional specimens used in preparing the following description. I am pleased to name the species after Dr. Osburn, a fellow student and friend for over forty years.

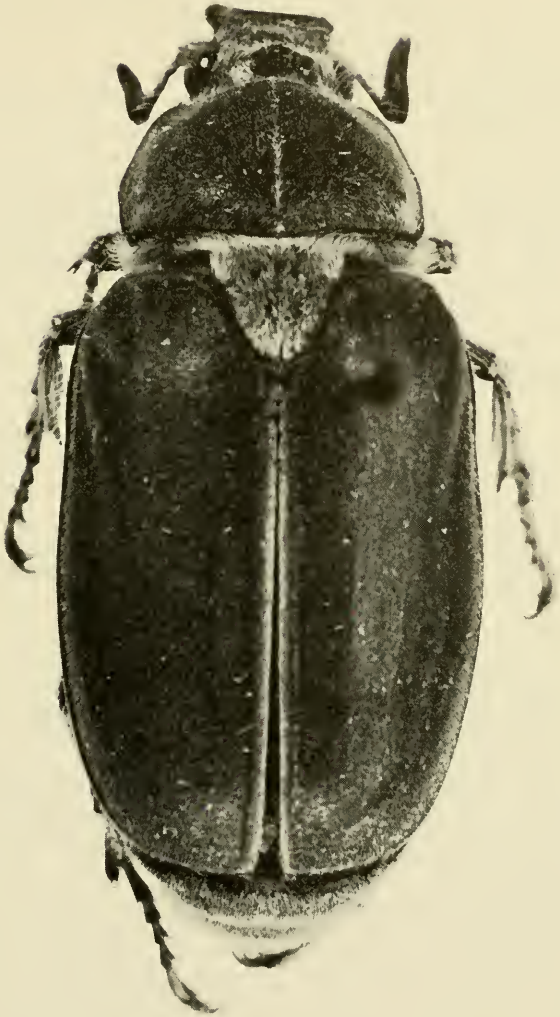
Thyce osburni Cartwright, new species

Holotype male: Length 21 mm., width 10 mm. Elongate oval, dark blackish brown, finely pubescent, with pronotal midline, scutellum, inner side of sutural costae of the elytra and underside white. Labrum free, emarginate. Clypeus very broadly deeply recurved anteriorly, densely coarsely setigerously punctate, the setae rather sparse, more or less recumbent and directed toward midpoint of the distinct, sinuate, frontal suture, the punctures gradually finer and closer laterally and along the suture; remainder of head densely, coarsely punctate but with a covering of dense white recumbent setae interspersed with long erect hairs, the erect hairs about as long as the clypeus, the recumbent setae less than half as long as the erect hairs. Clypeus widest in font with broadly rounded lateral anterior angles. Eyes large, separated by about 4 times their width. Antennae 10-segmented with 3-segmented club, the club subequal to stem, 3.5 times as long as terminal segment of maxillary palpus, and as long as basal width of clypeus.

Pronotum 4.5 mm. long, 7 mm. wide, anterior angles rounded, posterior angles distinct, sides sinuate, widest at middle, the anterior half arcuate outward, posterior half arcuate inward; distinctly margined except medially at base where bead becomes fine and obsolete; surface densely, moderately finely punctate, the punctures with rim distinct anteriorly and obsolete posteriorly, many uniting to form lines, densely covered with fine semi-recumbent brownish hair, the hair and its puncture generally directed toward midpoint of base but some lateral hair forming a swirl around lateral fovea; narrow, white midline with dense white hair directed posteriorly; a few scattered, very long, erect brownish hairs along anterior half of lateral margin, the anterior margin, and inward slightly toward disc of pronotum at middle. Scutellum with dense recumbent white hair. Posterior edge of pronotum below beading also with dense white hair between pronotum and elytra.

Elytra strongly margined laterally, somewhat depressed basally between humeri and anterior margin. Surface finely, densely covered with setigerous punctures, the fine hair as on pronotum but a trifle shorter, directed posteriorly, those on the sutural costae gradually becoming white along inner margin.

Sterna with very dense long white hair as on the posterior margins of the femora. Abdominal segments and pygidium covered closely with short, recumbent white hair from dense fine punctures, the abdominal segments with a narrow



Thyce osburni, n. sp. (6×).

smooth shining area anteriorly at middle. Femora and tibiae with much less dense mixture of short recumbent and long erect hair. Outer claw on all tarsi with strong basal tooth, inner claw with much smaller tooth.

Holotype collected May 19, 1966, in black-light trap in pecan orchard, 4¾ miles southeast of Albany, in Dougherty County, Georgia, by W. L. Tedders. USNM 69180.

The 22 male paratypes from same locality by same collector, July 1,

1964 to May 19, 1966. Variation is negligible in the typical series, length 20 to 23 mm., width 9 to 11 mm.

Thyce osburni, the only known species from eastern United States, differs from all species from western States by the very long, comparatively narrow club of its antennae. The length of the antennal club of *Thyce osburni* equals the width of the head between the eyes and is nearly as long as the entire head. It is 3.5 times the length of the fourth segment of the maxillary palpus. This species is strikingly and beautifully marked as well, the white, very distinct, narrow median line of the pronotum, white scutellum, dense white hair between the pronotum and elytra and the white suture of the elytra, all against the uniform dark brown of the rest of the upper surface, presents a very handsome appearance.

ANTHOMYIA PROCELLARIS RONDANI IN NORTH AMERICA

(Diptera, Anthomyiidae)

Anthomyia procellaris Rondani, 1866, Atti Soc. Ital. Sci. Nat. 9: 147;—1866–1871(?), Dipt. Ital. Prodr. 6: 154; Séguy, 1929, Encycl. Ent. (B2, Diptera) 5: 69;—1930, Mem. Soc. Sci. Nat. Maroc 24: 161; Tiensuu, 1935, Acta Soc. Faun. Flor. Fenn. 58(4): 13.

Séguy figured the male genitalia of specimens he identified with this species. Tiensuu figured parts of the male genitalia of specimens from Finland and stated that at least in that country the characters of the males of *A. pluvialis* (L.) and *A. procellaris* Rond. were rather constant.

It has been apparent to me for some time that a few species of *Anthomyia* occur in North America besides the 2 species so far recorded: *A. pluvialis* (L.) and *A. oculifera* Bigot (see Stone et al., 1965, Cat. Dipt. Am. north of Mex., U. S. Dept. Agr., Agr. Res. Surv., Agr. Handbook 276: 865). The identity of most of those species is not yet clear, but one of them agrees so well with the data of Séguy and Tiensuu concerning *A. procellaris* that I feel certain that the same species occurs in North America. I have examined specimens (all in USNM) from England as well as from the following North American localities: MICHIGAN; Livingston County, E. S. George Reserve, June 5, 1943 (G. Steyskal); MARYLAND: Bethesda, July 31, 1962 (C. W. Sabrosky), from puparia found in robin nest; WEST VIRGINIA: Natrium, July 3, 1961 (H. M. Kulman), from puparia found in tent of eastern tent caterpillar *Malacosoma americanum* (Fabr.); SOUTH CAROLINA: Clemson, December 8 and 14, 1966 (J. A. Payne), reared from pig carcass in tree.—George C. Steyskal, *Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D. C. 20560.*

TWO NEW METALLIC SPECIES OF HELINA FROM CHILE (DIPTERA: MUSCIDAE)[1]

H. RODNEY DODGE, 385 *Johnson Hall, Washington State University, Pullman, Washington*

In limited Chilean material from various sources two apparently new metallic Phaoniines have been found which seem best referred to *Helina*, though neither agrees fully with Malloch (1934) or other diagnoses of that genus.

Helina violescens, New Species

Length 7 mm. A blackish fly with thorax blue-black and abdomen blue-green. Legs black; eyes bare; squamae dark; parafacials and lunule silvery pollinose; 4 posterior dorsocentral bristles.

Male.—Front 0.13 of head width; frontal rows of about 10 pairs, the upper 3 or 4 hair-like; frontal vitta velvety black, broadened to lunule; parafrontals linear, dark pollinose; ocellar bristles very strong, proclinate; verticals undifferentiated; parafacials narrow, silvery pollinose; eyes bare; antennae black, segment 3 is 1.4 as long as 2; arista long, minutely pubescent; clypeus with antennal depressions; vibrissae slightly above oral margin; cheeks black, 0.2 of head height; occiput black-haired. Palpi black, slender.

Thorax shining blue-black, with 2 faint pollinose vittae on anterior half of notum. Chaetotaxy: Acrostichals 3:1; dorsocentrals 3:4; intraalars 1:2; supraalars 1:2–3 (prealar strong); humerals 3; notopleurals 2, posterior callus 2; scutellars 3 marginal, 1 small discal, some setules laterally outside the marginal bristles; propleuron bare; prosternum bare; metasternum bare; pteropleuron and hypopleuron bare; beret hairs 1–2; sternopleurals 1:2 to 2:3; postalar declivity bare; infrasquamals none. Spiracles black. Wing hyaline, veins bare, dark brown; vein 3 ends in wing apex; vein 4 straight, posterior cross vein sinuous; costal spine vestigial; basicosta and epaulet black; squamae blackish, the margins darker; lower lobe extends 0.75 beyond upper. Halters black. Legs black. Middle tibia with 2 small posterior bristles and none on anterior side; hind tibia lacks calcar, but with a very long, erect PD at apical fourth and 2 AD, 2 AV bristles.

Abdomen shining, blue-green, with scattered erect bristles on the sides of third and disc of fourth segments; venter black-haired; 1st sternum bare. Fifth sternum with a small notch; genital segments small, retracted.

Female.—Similar to male in most respects. Front slightly narrowed to vertex, which is 0.33 of head width; ocellars more divergent; ocellar triangle large, reaching half way to lunule; inner and outer verticals well developed; orbital bristles absent; frontal rows of about 8 pair of bristles; parafrontals setulose; parafacials glabrous on upper half; costal spine longer, double in allotype, vestigial in most paratypes; tibial bristles identical to the male.

Type Series.—Holotype male, Las Condes, Santiago Prov., Chile, Oct. 6–12, 1958 (Luis Peñas); Allotype and two male, one female para-

[1] Scientific paper No. 2621, Washington Agricultural Experiment Station; Project No. 9043.

types, "Concep(cion), 1.Oct.(19)55, J. A. Coll."; 1 female, Quintero, Oct. 15, 1951 (Maria Etcheverry); 2 females, Angol, Chile, Nov. 9 and Sept. 19, 1950 (D. Cataldo); 1 female, Quillota, Valparaiso Prov., Chile, Dec. 30, 1954 (Luis Peñas); 5 males, Barrancas, Santiago, Chile, Mar. 14, 1955 (Luis Peñas); 2 males, 21 females, Dalcahue, Chiloe Prov., Chile, lat. 42°23′, Feb. 10–20, 1957 (Luis Peñas); one male, Maullin, Chile. Holotype, allotype and paratypes at Washington State University; paratypes to be sent to Prof. Jorge Artigas, Univ. of Concepcion; Prof. Maria Etchevvery and the U. S. National Museum.

This species keys to *Helina* (part) in Couplet 5b of *Snyder* (1940) because the hypopleuron is bare; however the presence of setules about the posterior notopleural bristle and on the outer margin of the scutellum would exclude it from that group in couplet 4. In Malloch's key (1934) it runs to *viola* Malloch, but differs by the bare eyes, hyaline wings and smaller size. If the PD bristle of the hind tibia is interpreted to be the calcar, this species runs to *Euphaonia fulvohumeralis* Malloch, which is obviously different. It seems better to refer it to *Helina*, at least for the present.

Three of the five Barrancas males have the wings deeply yellowed but do not appear to differ otherwise. Some specimens may have three pairs of postsutural acrostichals, but only the prescutellar pair is strong.

Helina veniseta, New Species

Length 7 mm. Superficially very similar to the preceeding species but lunule and parafacials with blackish pollen, cruciate interfrontals present, acrostichals 2:3, all very strong, notopleuron with scattered setules about both bristles and vein 3 setulose.

Female.—Head black; eyes extremely sparsely and minutely spiculose. Front parallel-sided, 0.33 of head width; frontal rows of 9–10 pair, the upper 2 pair reclinate; frontal vitta broad, velvety black, with a pair of cruciate interfrontals and the ocellar triangle reaching about 0.33 to lunule from the anterior ocellus; ocellar and vertical bristles very strong; no orbitals; parafrontals narrow, with a row of black setules; parafacials wider, polished on upper half, blackish pollinose below; antennae black, segment 3 is 1.4 as long as segment 2; arista very minutely pubescent to tip; vibrissa as in preceeding species; cheek 0.25 of head height; cheek, metacephalon and occiput entirely black-haired; palpi black, slightly swollen; haustellum short. The antennal axis is 0.64 and vibrissal axis 0.63 of the head height.

Thorax bluish-black, faintly dusted along front margin; acrostichals 2:3; dorsocentrals 2:4; intraalars 1:2; supraalars 1:3, the prealar subequal to the posterior notopleural; humerals 3; notopleurals 2 plus many setules; posterior callus 2; scutellars 3 strong marginals and a weaker basal, 2–3 discals; propleuron and prosternum bare; sternopleurals 2:2; pteropleuron setuled on posterior half; hypopleuron setuled before the spiracle, bare below; beret hairs present; infrasquamals absent. Posterior spiracle large, oval, without bristles in lower margin; supraspiracular convexity equal in size and shape to the spiracle, pilose. Legs black;

hind tibia with erect PD at apical fifth and 2 AD and 2–3 AV at about middle; hind femur with complete AD and AV rows; middle tibia with 3 P, no PV bristles; middle femur with a complete PV row, the basal 2–3 stout and erect; anterior tibia with only one outstanding bristle, dorsal and subapical. Wing hyaline, veins dark; vein 3 with dorsal setules at base, extending half way to the cross vein, ventrally bare on node, followed by 3 small setules, visible on one wing only; vein 3 apically rather strongly bowed; vein 4 straight on apical section; remigium bare; costal spine vestigial; basicosta and epaulet black; squama blackish with black margins, the lower lobe subtriangularly rounded, projecting about halfway beyond the upper lobe; halters black.

Abdomen shining blue, the 4th segment concolorous, with scattered, erect hairs. Venter black-haired, the first sternum bare.

Male.—Unknown.

Holotype.—Female, Las Condes, Santiago Prov., Chile, Oct. 6–12, 1958 (Luis Peñas), at Washington State University.

The setulose vein 3 would exclude this species from *Helina*. However, in Malloch's key it does not fully agree with *Myiospila* because vein 4 is straight nor with *Hydrotaea* because of the absence of a proclinate orbital bristle, so it would key falteringly to *Helina*. Its resemblance to *violescens* may be more than superficial. In Curran's (1934, 1965) Manual it runs to *Mydaea*, but it is excluded from that genus by the presence of anterior acrostichal and female interfrontal bristles. If keyed past *Helina* in Malloch it differs from the metallic *Darwinomyia* by the eye not conspicuously pilose, the presence of hypopleural hairs and absence of PV bristles on the middle tibia; from *Euphaonia fulvohumeralis* Malloch by the clavate palpi, from *Psilochaeta* by the presence of cruciate interfrontals in the female and from *Brachygasterina* by the hypopleural hairs. Furthermore, all of these genera are stated in Malloch's key to have vein 3 bare.

Helina violescens and *veniseta* do not agree with any of the metallic Muscidae described from Argentina by Shannon and del Ponte (1926). In Albuquerque's (1952) key to metallic Neotropical Phaoninae they run best to *Brachygasterina* and differ from *Xenomorellia* Malloch and *Dasymorellia* Malloch by the remigium bare.

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SYNONYMY IN THE LYGAEIDAE
(HEMIPTERA)[1]

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Syzygitis reflexa Bergroth, 1921. Ann. Soc. Ent. Belg. 61:165.

The taxonomic position of this monotypic genus has been an enigma for many years. Bergroth related it to *Polychisme* and Scudder (1962. Trans. Roy. Ent. Soc. Lond. 114:193) suggested that the two genera were "most probably" congeneric.

In the Helsinki Museum is a female of *Polychisme poecilus* (Spinola) which certainly is the type specimen of *Syzygitis reflexa.* It fits the Bergroth description in every particular and the locality data ("Chile, Concepc. (P. Herbst)") is identical. A holotype label has been placed on this specimen. *Syzygitis* is here formally placed as a junior synonym of *Polychisme* and *S. reflexa* a junior synonym of *P. poecilus.* **New synonymy.**

The key to the two species of *Polychisme* given by Scudder (1962) is inaccurate as in a series of thirty-two specimens of *poecilus* from Chile the variation in number of corial punctures covers the entire range of numbers used by Scudder to differentiate *poecilus* from the Central American *ferruginosus* (Stål).

P. poecilus, like most other ischnorhynchines, is usually found in the macropterous condition. I have in my collection, however, a series of six specimens that I take to be conspecific with *poecilus* that are strongly coleopteroid, with the clavus and corium distinct and the latter strongly broadened and rounded laterally, more convex dorsally, and with the apical corial angle extending back to the antero-lateral corner of abdominal tergum seven. The membrane is thus correspondingly small, although attaining the apex of the abdomen. Such coleopteroid conditions are frequently associated with relatively stable habitats and/or old stable land areas, and in the present case would seem to have great zoogeographic significance as these insects apparently are associated with *Nothophagus* in Chile.

Lethaeus simpsoni Bergroth, 1912. Ann. Mag. Nat. Hist. (8):10:195.

This species was originally described from "Badagri, Southern Nigeria (J. J. Simpson)." As usual Bergroth did not indicate type specimens or so label his material. However, the Helsinki Museum possesses a male specimen with the above locality data plus "1910-213., 1-2-10", and the scientific name in Bergroth's handwriting. This is cer-

[1] This work was supported by a grant in aid from the National Science Foundation.

tainly the type specimen and a red holotype label has been placed on the pin.

L. simpsoni, despite Bergroth's statement that it is "very distinct in several characters" appears to me to be indistinguishable from *Lethaeus africanus* Dallas, and is here formally synonymized. **New synonymy.**

Apteroloides Slater, 1964. South African Animal Life 10:60–61.

Unfortunately the five year period that the above paper was in press has resulted in a case of synonymy. The genus *Apteroloides* was described with *Aspilocoryphus signatus* Distant 1918 as type species and also included *Apterola angusticollis* Lindberg 1939. Seidenstucker (1964. Reichenbachia 2:56:199–207) described the genus *Stenaptula* with *Apterola angusticollis* Lindberg as type species. Since Seidenstucker's paper appeared in January of 1964 it has priority and *Apteroloides* Slater becomes a junior synonym of *Stenaptula* Seidenstucker. **New synonymy.**

Blissus obscurus Slater, 1964. South African Animal Life 10:102.

This specific name is a junior homonym of *Blissus doriae obscurus* Reuter (1888. Rev. d'Ent. 7:223) described from Greece. I propose, therefore, the name *Blissus latoides* **new name** to replace *Blissus obscurus* Slater, preoccupied.

Lasiosomus bellus Slater, 1964. South African Animal Life 10:159.

Again the press time of my South African paper appears to have resulted in a case of synonymy. *L. bellus* had originally appeared in my manuscript as *L. minutus*, but was changed to *bellus* in the galley (by oversight it still appeared as *minutus* in the key) due to the appearance of the description of a *Lasiosomus minutus* by Scudder (1962. Mus. Roy. Afr. Cent. Sci. Zool. N. 110, p. 423). It now appears to me that *bellus* is actually synonymous with *Lasiosomus minutus* Scudder and the former becomes a junior synonym. **New synonymy.**

Naphiellus Scudder, 1962. Can. Ent. 94:982.

This genus was described by Scudder for *Aphanus latus* Distant from India. Slater (1964. S. Afr. Animal Life 10:189) synonymized *latus* with *Rhyparochromus dilutus* Horvath 1892. Therefore the correct name for the taxon should be *Naphiellus dilutus* (Horvath).

Pachymerus crudelis Haglund, 1895. Ofv. Vet. Akad. Forh. 7:462–3.

This species was originally described by Haglund in the omnibus genus *Pachymerus* and subsequently placed in *Lachnophoroides* by Distant (1918. Ann. Mag. Nat. Hist. (9):2:260). However, this latter genus is said by Distant 1920 to pertain to the Oxycareninae. (I have not seen the type species *L. ornatipennis* Distant 1914 from New Caledonia.) *Crudelis* Haglund is a rhyparochromine and belongs to the genus *Dieuches*.

THE NEARCTIC DORYCTINAE, IV. NOTES ON THE GENUS DENDROSOTER WESMAEL AND DESCRIPTION OF ONE NEW SPECIES

(Hymenoptera, Braconidae)

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Muesebeck (1938) revised the genus *Dendrosoter* for the United States, discussing generic synonymy and providing a key to the four known species. The present paper provides additional distribution records for two species and a description of a new one from the southwestern United States. The records listed below are in addition to those found in the Hymenoptera Catalogue (Muesebeck and Walkley, 1951) and its two supplements (Muesebeck, 1958 and 1967).

Dendrosoter protuberans (Nees)

Bracon protuberans Nees, 1834, p. 121.

This species is being studied in Michigan and Ohio as a potential control agent for *Scolytus multistriatus* (Marsham), the smaller European elm bark beetle. It is listed here in the likely event that it will become established in the United States. In Muesebeck's key (1938, p. 282), *protuberans* will run to couplet 3 and agrees most closely with *integer* Muesebeck. However, the males of *protuberans* are easily recognized by their swollen third segment of the maxillary palpus and by the short stigma in the hindwing (fig. 1); the females are distinguished by the shorter malar space which is less than one-half of the eye height.

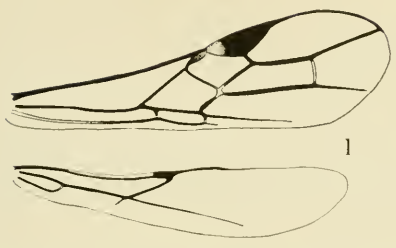
Dendrosoter sulcatus Muesebeck

Dendrosoter sulcatus Muesebeck, 1938, p. 284.

I have seen specimens from Georgia, Louisiana, Mississippi, and New York. This species has previously been recorded from Florida, North Carolina, Virginia, Washington, D.C., Wisconsin, and Texas. The range of *sulcatus* is probably throughout the states east of the Great Plains.

Dendrosoter chansleri Marsh, n. sp.

Female.—Length 4.5 mm. Color dark brown except calli on head and basal antennal segments which are lighter brown. Head cubicle; frons deeply excavated between calli; temples and malar space equal to eye height; face, temples, and vertex finely rugulopunctate, frons rugolose with a weak median longitudinal carina from antennae to median ocellus; calli strongly rugose; antennae 25 segmented, inner edge of first and second flagellar segments concave, length of first flagellar segment nearly equal to second. Mesonotal lobes granular; notauli deep, meeting before scutellar furrow in a wide coarsely rugose area; mesopleural disc



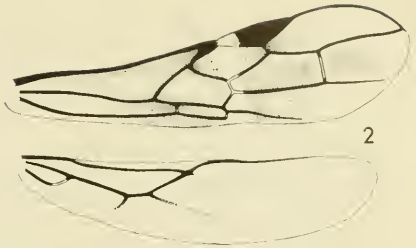


Fig. 1. *Dendrosoter protuberans* (Nees), fore and hindwings, ♂.
Fig. 2. *D. chansleri* Marsh, n. sp., fore and hindwings, ♀.

finely reticulate; mesopleural furrow shallow, foveolate, slightly longer than one-half width of mesopleuron; scutellar furrow deep, with numerous cross carinae; scutellar disc granular; propodeum entirely rugose, carinae definite only on apical edge. Wings maculated, venation as in fig. 2. Hind coxae coarsely striate. First abdominal tergum as long as apical width, longitudinally striate, without a definite raised median area; tergum (2 + 3) longitudinally striate on basal one-third; remainder of abdominal terga smooth; ovipositor a little longer than abdomen.

Male.—Unknown.

Holotype Female.—NEW MEXICO: Lincoln National Forest, J. F. Chansler, Hopk. U.S. 37240-G, *Pinus ponderosa*, in association with *Dendroctonus adjunctus*. USNM 68927.

Paratypes.—3 ♀ ♀, same data as holotype; all deposited in U.S. National Museum.

This species runs to *integer* in Muesebeck's key but differs in its larger size, color, coarser sculpturing, larger rugose area where notauli meet, deeper notauli, wing maculations rather than cross bands, more convex scutellum, and lack of definite carinae on the propodeum.

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ADDITIONAL SYNONYMIES WITHIN THE AMBLYCERAN BIRD LICE (MALLOPHAGA)[1]

ROGER D. PRICE[2] and K. C. EMERSON[3]

During the past year a number of new synonymies within the bird lice have come to our attention. These are as follows:

Colpocephalum aculeatum Piaget, 1885, Pediculines Suppl.: 121.
Colpocephalum olivaceae Price and Beer, 1965, Ann. Ent. Soc. Amer. 58: 119. **New synonymy.**

Piaget's species was based on a ♂ (Piaget Collection slide 1121 at the British Museum (Natural History)) supposedly from a specimen of *Columba iriditorques* Cassin in the Museum de Leide. Subsequently, Hopkins and Clay (1952) stated that *C. aculeatum* was actually from some member of the Psittaciformes and they placed it in *Psittacomenopon.* Recent study has shown that *C. aculeatum* and *C. olivaceae* are conspecific, with the true host probably being *Lampribis olivacea,* a ciconiiform and the type-host of *C. olivaceae.* Coincidentally, Piaget (1885) also described *Laemobothrion pallidum* from the same host species as that for *C. olivaceae,* to substantiate that he had material available from that host.

Colpocephalum angolensis Price and Beer, 1963, Can. Ent. 95: 750.
Colpocephalum angolensis Tendeiro, 1964, Ann. Mus. Roy. l'Afr. Cent., Ser. 8, No. 132: 171. **New synonymy.**

This is a situation in which the same name was given in 2 separate descriptions for what is obviously the same species of louse.

Colpocephalum heterosoma Piaget, 1880, Pediculines: 572.
Colpocephalum poopoensis Carriker, 1956, Rev. Brasil. Ent. 5: 140. **New synonymy.**

Carriker (1956) described both *C. heterosoma boliviana* and *C. poopoensis* from specimens of a single series taken from *Phoenicopterus chilensis* Molina. Price and Beer (1965a), without examination of the types, were able to determine that *C. heterosoma boliviana* was a synonym; and that *C. poopoensis* was also probably a synonym of *C. heterosoma.* We have now studied Carriker's type-series of both, including the holotype ♂ of each (USNM 68655 and 68656, respectively), and believe they are morphologically inseparable from *C. heterosoma* found on *P. antiquorum* Temminck. Clay (1951) has pointed out the

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great amount of variation within ♂ ♂ of *C. heterosoma*; Carriker's holotype of *C. heterosoma boliviana* is a specimen of the "small" form and his holotype of *C. poopoensis* is one of the "large" form. To add further to his confusion, Carriker included both a "small" and a "large" form within his paratypes of *C. poopoensis*. The ♂ genitalia as illustrated by Carriker (1956: Figs. 24, 26, 27), and upon which he placed considerable importance, are actually inseparable, the differences as shown either being due to his interpretation or to an oversight of parts.

Colpocephalum nanum Piaget, 1890, Tijdschr. Ent. 33: 257.
Neocolpocephalum buteonis Eichler, 1954, *in* Bach and Eichler, Monatsch. f. Veterinärmed. 9: 13. **New synonymy.**

Price and Beer (1963) placed *N. buteonis* as a *species sedis incertae* due to its unrecognizable description. We recently obtained from the Zoologisches Museum of Hamburg 3 ♀ paratypes of *N. buteonis* (WEC 1748a, WEC 4072ab, WEC 4072v), all of which are typical *C. nanum*. The illustration of the dorsal ♀ terminalia by Eichler (Bach and Eichler, 1954: Fig. 1) is misleading and must either represent a misinterpretation of certain details or possibly a distorted specimen. Since these 3 ♀ ♀ are the only specimens of the type-series known to be available for study, since they bear the same collection data as the holotype, and since they are from *Buteo buteo* (L.), a bird commonly infested with *C. nanum*, we can only conclude that *N. buteonis* is a junior synonym of *C. nanum*.

Colpocephalum napiforme Rudow, 1869, Z. Naturwiss. 34: 395.
Colpocephalum heterospizium Carriker, 1963, Mem. Soc. Cien. Natur. La Salle 23: 15. **New synonymy.**

A ♀ paratype from the same collection as the holotype ♀ is inseparable from *C. napiforme*; the illustration of the ♂ genitalia by Carriker (1963: Plate III, Fig. 3a) may likewise be construed as being similar to those of *C. napiforme*.

Colpocephalum pectinatum Osborn, 1902, Ohio Nat. 2: 201.
Colpocephalum ictiniae Carriker, 1963, Mem. Soc. Cien. Natur. La Salle 23: 13. **New synonymy.**

The type-series of *C. ictiniae* composed of the ♀ holotype (USNM 68759), ♂ allotype, and 3 ♀ paratypes supposedly from a single collection from *Ictinia plumbea* (Gmelin), a falconiform, are all typical owl *Colpocephalum* and compare favorably with material we have seen of *C. pectinatum*.

Ciconiphilus decimfasciatus (Boisduval and Lacordaire, 1835), Faune Ent. Environs Paris: 123.
Ciconiphilus pilherodii Carriker, 1964, Rev. Brasil. Biol. 24: 102. **New synonymy.**
Ciconiphilus agami Carriker, 1964, Rev. Brasil. Biol. 24: 103. **New synonymy.**

A study of the ♀ holotype (USNM 68869), ♂ allotype, and a ♀ paratype of *C. pilherodii* and the ♀ holotype (USNM 68870) and ♂ allotype of *C. agami* has shown both series to agree well with specimens of *C. decimfasciatus* as delimited by Price and Beer (1965b).

Ciconiphilus quadripustulatus (Burmeister, 1838), Handb. Ent. 2: 438.
Colpocephalum sphenorhynchus Tendeiro, 1964, Ann. Mus. Roy. l'Afr. Cent., Ser. 8, No. 132: 173. **New synonymy.**

Specimens from *Sphenorhynchus abdimii* (Lichtenstein), the type-host of *C. sphenorhynchus*, have been examined previously (Price and Beer, 1965b) and found to be conspecific with *C. quadripustulatus*. These specimens agree well with the description of *C. sphenorhynchus*.

Cuculiphilus (Aegypiphilus) gypsis Eichler, 1944, Dtsch. Ent. Z. 1943: 57.
Aegypiphilus contrastus Eichler and Zlotorzycka, 1963, Acta Parasitol. Polonica 11: 216. **New synonymy.**
Aegypiphilus secundus Eichler and Zlotorzycka, 1963, Acta Parasitol. Polonica 11: 217. **New synonymy.**

Scharf and Price (1965) discussed their reluctance to render an opinion on these names in view of material seen to that time. Since then, however, we have obtained for study the holotype ♀ of *A. contrastus* and the holotype ♂ of *A. secundus*. We have found no significant differences between the ♀ holotype and only specimen known to date of *C. gypsis* and ♀ ♀ of *A. contrastus* and no significant differences between the ♂ holotype and only specimen known to date of *A. secundus* and ♂ ♂ of *A. contrastus*. Eichler and Zlotorzycka (1963) unfortunately provided no adequate separating characteristics for these lice; as a result, we feel there is now no longer justification for recognizing these as separate species.

Kurodaia caputonis (Carriker, 1966), Amer. Midl. Nat. 76: 77.
Conciella clamatori Carriker, 1966, Amer. Midl. Nat. 76: 78. **New synonymy.**
Conciella setosa Carriker, 1966, Amer. Midl. Nat. 76: 79. **New synonymy.**
Conciella glaucidiae Carriker, 1966, Amer. Midl. Nat. 76: 79. **New synonymy.**

Carriker (1966) described the above 4 species of *Conciella* consecutively. We have studied his type-series, including the holotype of each, and can find no means for separating them. Presumed differences cited in the descriptions are attributable primarily to distortions in the handling of the specimens. These specimens are extremely close to *Kurodaia crassiceps* (Piaget), and may eventually prove inseparable, but *K. caputonis*, with dimensions generally slightly smaller and with a narrower, more clearly defined, somewhat pointed penis, is maintained here as a distinct species, with page priority over the 3 junior synonyms.

Laemobothrion maximum (Scopoli, 1763), Ent. Carniolica: 382.
Laemobothrion (*Laemobothrion*) *grandiculus* Tendeiro, 1964, Ann. Mus. Roy. l'Afr. Cent., Ser. 8, No. 132: 185. **New synonymy.**

No reliable difference has been demonstrated between specimens of *Laemobothrion* from *Buteo rufofuscus* (J. R. Forster), the type-host of *L. grandiculus*, and other series considered to represent *L. maximum* (see Nelson and Price, 1965).

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NEOPARENTIA, A NEW GENUS OF AMERICAN DOLICHOPODIDAE (DIPTERA)

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During the century since the recognition of *Sympycnus* Loew, the genus has been relatively ill-defined and has been easily confused with other genera in various subfamilies such as *Symbolia* (Diaphorinae), *Stolidosoma* (Stolidosominae), and *Peloropeodes* (Rhaphiinae). The most critical efforts have left a large and variable genus, and attempts at further subdivision have depended excessively on characters limited to the male sex. Only recently it has been possible to clarify the status of one very natural and uniform segregate genus, *Calyxochaetus*, which differs from *Sympycnus* by the lack of hairs on the scutellum (Robinson, 1964).

Collecting in southern Mexico I have found a number of species of Sympycninae which lack hairs on the scutellum but otherwise in no way resemble *Calyxochaetus*. These species all possess long thread-like hypopygial lamellae, a character that led Parent (1954) to describe a related species from Costa Rica as a *Nematoproctus*. For these species I propose the recognition of the following new genus.

Neoparentia, gen. nov.

Setae mostly black. Face very narrow, usually with eyes contiguous near the middle in the male; front broad, broader above, mostly metallic greenish or bluish; palpi small; proboscis brownish; antennal segment 1 bare above, segment 2 truncate apically, segment 3 with arista dorsal; lower orbital setae uniseriate, pale. Mesoscutum not flattened posteriorly; acrostichals uniseriate; 6 pairs of dorsocentrals; 2 scutellars, scutellum without hairs; proepisternum with only a few pale setae above. Middle and hind coxae with an external bristle; mid femur with both anterior and posterior preapical; hind femur with 1 or 2 preapicals anteriorly; front metatarsus of male not shortened. Wing elongate oval: veins 3 and 4 nearly straight and parallel to noticeably divergent beyond the crossvein; last part of vein 5 distinctly longer than crossvein; vein 6 represented by slight fold. Abdomen cylindrical in male, 6 tergites visible; hypopygium small usually rather globose, placed on tip of abdomen; lamellae filliform.

Type species, *Neoparentia bisetosa* sp. n.

The various hypopygia of *Neoparentia* are highly divergent in form but in no case show the conical shape that is typical of *Calyxochaetus*. Neither are the hypopygial lamellae short and inconspicuous as in that genus. In addition, *Calyxochaetus* usually has a shining violet front (obscured by pollen in *C. nodatus*), and usually has the front metatarsus of the male shortened (not shortened in *C. metatarsalis*). The face of *Neoparentia* is narrower in both sexes, ¼ as wide below as high in the female compared ⅓ or more as wide below as high in the female of *Calyxochaetus*.

The new genus contains two rather different elements, the smaller species showing little superficial resemblance to the larger ones. Apparently *Neoparentia* is itself a complex showing considerable evolutionary divergence.

KEY TO THE SPECIES OF **Neoparentia**

1. Abdominal tergites 2 and 3 yellow on the side; sternite 5 sometimes with a pair of stout rodlike setae; hypopygial capsule forming a pair of long slender projections on the forward end; length usually 3 mm or more 2
   Abdominal tergites wholly dark, sternite 5 without rodlike setae; hypopygial capsule blunt or with only short projections on the forward end; length less than 3 mm 4
2. Metepimeron yellow; abdominal sternite 5 without large rodlike setae (Costa Rica) ..... **bicolor** (Parent)
   Metepimeron dark; abdominal sternite 5 of male with large rodlike setae 3
3. Length 2–3 mm; second joint of male fore tarsus somewhat thickened (California) ..... **caudata** (Van Duzee)
   Length 3–3.5 mm; fore tarsus of male plain (Oaxaca, Chiapas) ..... **bisetosa** sp. n.
4. Palpus white; acrostichals sparse or lacking posteriorly; wing of male with tip deformed, veins 3 and 4 strongly diverging apically (Oaxaca, Chiapas) ..... **deformis** sp. n.
   Palpus dark; acrostichals distinctly reaching onto posterior slope; wing of male not greatly deformed, veins 3 and 4 hardly diverging apically 5
5. Hind tibia with two anterodorsals; male fore tarsus with last joints modified, usually folded against each other (Oaxaca, Chiapas) ..... **tarsalis** sp. n.
   Hind tibia with only one anterodorsal; fore tarsus plain 6
6. Lower pleural surface yellow; wing veins 3 and 4 slightly diverging apically (Costa Rica) ..... **schildi** sp. n.
   Pleura totally dark; wing veins 3 and 4 parallel apically (Oaxaca, Chiapas) ..... **obscura** sp. n.

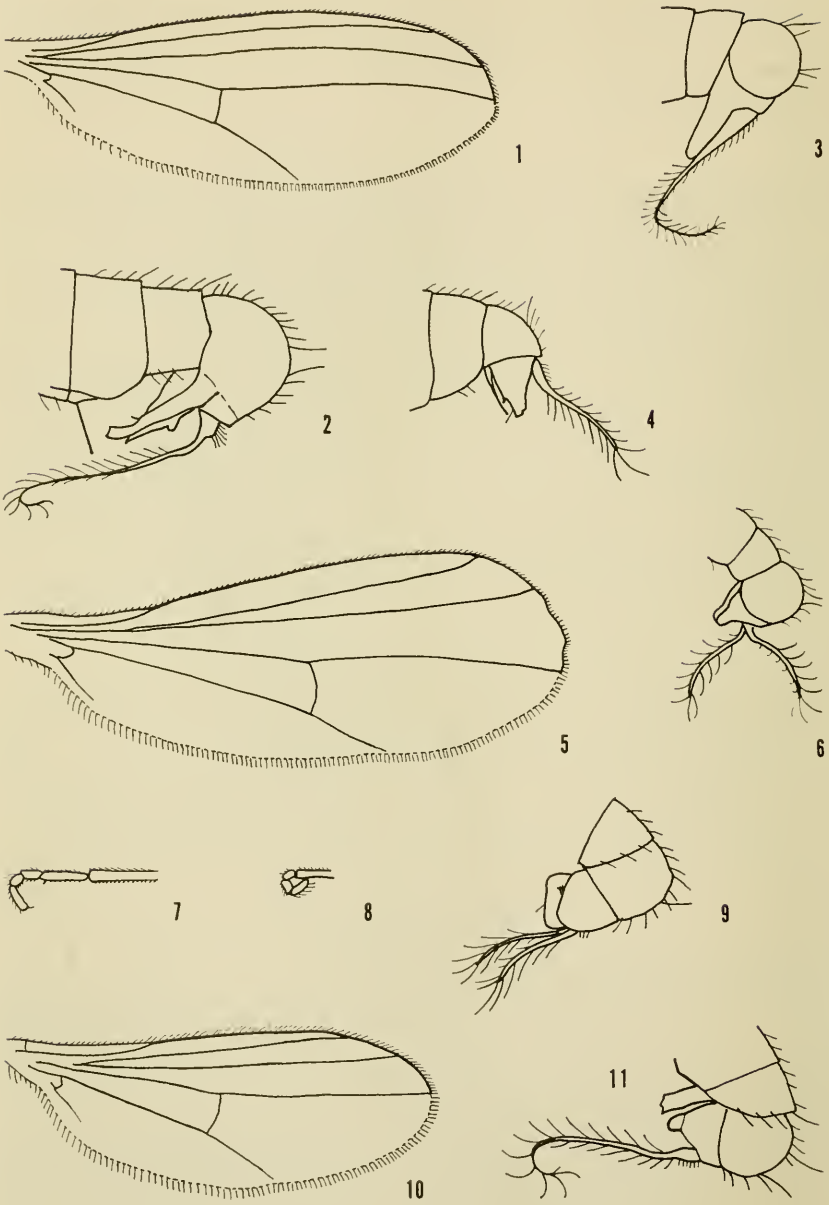
Neoparentia bisetosa sp. n.
(Figs. 1, 2)

Male.—Length 3.4 mm; wing 3.2 mm by 1.1 mm.

Face long and narrow with eyes nearly contiguous in lower half, gradually wider above, covered with yellowish-white pollen; front metallic bluish with slight yellowish pollen. Palpus pale. Antenna brown, first and part of second segment yellow, first rather narrow; second segment very short; third segment about as long as wide, rounded apically; arista basal.

Mesonotum metallic greenish dulled with yellow pollen, darker lines following rows of bristles, grayer pollen on sides; metepimeron mostly darkened, pale below. Acrostichals reaching onto posterior slope.

Legs mostly yellow; distal joints of tarsi, tip of hind femur and tibia, and all of hind tarsus dark; setae mostly black, pale setae anteriorly on fore and middle coxae and ventrally on femora. Middle femur with a row of short erect black setae near base on posteroventral surface; middle tibia with large anterodorsal and posterodorsal near basal fourth, anterodorsal and crest of about eight ventrals near distal



Figs. 1–11, *Neoparentia*, males. Figs. 1–2, *bisetosa* sp. n.: 1, wing; 2, hypopygium. Fig. 3, *bicolor* (Parent), hypopygium (after Parent, 1954). Figs. 4–5, *deformis* sp. n.: 4, hypopygium; 5, wing. Fig. 6, *obscura* sp. n., hypopygium. Figs. 7–10, *tarsalis* sp. n.: 7–8, fore tarsi; 9, hypopygium; 10, wing. Fig. 11, *schildi* sp. n., hypopygium.

third, one subapical ventrally, two or three apicals; hind tibia with two anterodorsals, five or more posterodorsals, five or more indistinct ventrals, four apicals. Lengths of joints of fore tarsus from base as 9-5-4-3-2; middle tarsus as 12-7-6-4-3; hind tarsus as 8-12-8-5-4.

Wing slightly brownish tinged; third and fourth veins curving slightly backwards and converging slightly toward the tip, essentially parallel at the tip, crossvein about half as long as last of fifth vein; anal margin slightly but distinctly rounded. Tip of calypter dark, its setae and the halter pale.

Abdomen very elongate; second and third segment yellow with brown fore and hind margins, other segments brown; setae mostly black; fifth sternite bearing a pair of long stiff blunt bristles.

Female face wider, as wide as third antennal segment, covered with gray pollen; all segments of antennae short, third wider than long. Middle femur without distinct posteroventrals; middle tibia with only two ventrals, one near basal and one near distal third. Anal margin of wing slightly more prominent.

Holotype male, allotype female, three male and ten female paratypes, from around puddles on trail, ridge above Pueblo Nuevo, Chiapas, Mexico, Dec. 24, 1962. Two female paratypes, from small pool in pine forest, near crest of Sierra Juarez above Ixtlán de Juarez, Oaxaca, Mexico, May 19, 1963. Holotype and allotype in U.S. National Museum, others presently in the author's collection.

The species is the largest in size of those now known in the genus. The pair of rod-like appendages on the venter of the abdomen are rather distinctive, but recently Harmston and Miller (1966) have called attention to such structures in the following apparently related species from the Western United States.

Neoparentia caudata (Van Duzee) comb. n.

Sympycnus caudatus Van Duzee, 1917, Can. Ent. 49: 338.
Parasyntormon caudatum (Van Duzee) Harmston and Miller, 1966, Proc. Ent. Soc. Wash. 68: 92.

This California species differs from *N. bisetosa* by the smaller size, 2–3 mm, the more restricted yellow coloration at the base of the abdomen, and the somewhat thickened second joint of the fore tarsus. Harmston and Miller (1966) call attention to the paired setae on the venter of the abdomen which are similar to those in many species of *Parasyntormon*. According to the illustration by Van Duzee (1930) the antenna of his species is of a *Sympycnus* or *Neoparentia* type and completely unlike *Parasyntormon*. Van Duzee describes the hypopygial lamellae as very long, yellow, fringed with long hairs. Though such lamellae are found in the genus *Sympycnus*, apparently paired rod-like setae on the abdominal sternites are not. Pubescence of the scutellum has not yet been noted.

Neoparentia bicolor (Parent) comb. n.
(Fig. 3)

Nematoproctus bicolor Parent, 1954, Beitr. Ent. 4: 223.

The species is most obviously distinct from *Nematoproctus* by the lack of numerous long pale hairs on the upper part of the proepisternum. Of particular note in Parent's (1954) original description are the following:

Length 3.0 mm; palpus creamy white, antenna yellow; a single series of acrostichals; metepimeron, coxae, abdominal segments 2 and 3 and sides of 4 and 5 yellow; middle femur with series of 3–4 rigid setae ventrally near the base, middle tibia with 2 setae of remarkable length ventrally in the apical part; setae of calypter black.

Neoparentia deformis sp. n.
(Figs. 4, 5)

Male.—Length 2.8–3.0 mm; wing 3.6 mm by 1.3 mm.

Face long and narrow, gradually wider above, covered with yellowish-white pollen; front with metallic bluish ground color nearly obscured by dense yellowish-brown pollen. Palpus white with white hairs which are more prominent apically. First two antennal segments yellowish, third segment brown; first segment long and narrow; second very short; third longer than wide, triangular, rounded basally; arista nearly basal.

Mesonotum metallic bluish nearly obscured by dense yellowish brown pollen; pleural surface dark with grayish pollen, lower half of metepisternum yellow. A series of acrostichal setae anteriorly, posteriorly acrostichals sparse or lacking.

Legs almost wholly yellow, hind tarsus dark distally; setae mostly black, some pale setae anteriorly on fore and middle coxae and ventrally on femora. Middle tibia with antero- and posterodorsal near basal third, anterodorsal and ventral near distal third, four apicals; hind tibia with one anterodorsal, about four posterodorsals, two or three small ventrals, four apicals. Lengths of joints of fore tarsus from base as 10-4-3-2-2; middle tarsus as 11-5-4-2-2; hind tarsus as 6-7-4-2-2.

Wing clear, broadly rounded and slightly crinkled apically; third vein curving gradually forward near the tip, fourth curving gradually backward near tip and prominently divergent from third; crossvein three-fourths as long as last of fifth vein; anal margin slightly but distinctly rounded. Tip of calypter dark, its setae pale; knob of halter slightly to distinctly brownish.

Abdomen very elongate, drooping, brown; hypopygium small for the genus.

Female face as wide as antenna, grayish; third antennal segment only about as long as wide, subacute; hind tibia with three or four rather distinct ventrals; third and fourth wing veins only slightly divergent at tips, anal margin slightly more prominent.

Holotype male, allotype female, and eight male paratypes, from small pool in pine forest, near crest of Sierra Juarez above Ixtlán de Juarez, Oaxaca, Mexico, May 19, 1963. One female paratype, by puddles on trail, ridge above Pueblo Nuevo, Chiapas, Mexico, Dec. 24, 1962. Holotype and allotype in U.S. National Museum, others presently in the author's collection.

Neoparentia obscura sp. n.
(Fig. 6)

Male.—Length 2.0 mm; wing 2.2 mm by 0.9 mm.

Face long and very narrow, almost obliterated in lower part, covered with yellowish pollen; front metallic bluish dulled with grayish yellow pollen. Palpus dark. First two segments of antenna yellowish, first narrow, second shorter and broader; third segment brown, triangular, pointed, half again as long as wide; arista basal.

Mesonotum metallic bluish green, dulled with grayish pollen anteriorly; pleura brownish, lower half of metapisternum yellow. Acrostichals reaching onto posterior slope.

Legs wholly yellow with setae black. Middle tibia with two rather long anterodorsals, first paired with a shorter posterodorsal near basal fourth, small ventral near distal third, three apicals; hind tibia with one anterodorsal near base, three or four shorter posterodorsals, two or three rather indistinct ventrals. Lengths of joints of fore tarsus from base as 8-5-4-3-2; middle tarsus as 10-5-4-3-2; hind tarsus as 5-7-5-3-3.

Wing clear; third and fourth veins nearly straight and essentially parallel beyond crossvein; crossvein about half as long as last of fifth vein; anal margin distinctly rounded. Tip of calypter and its setae black; knob of halter brown.

Abdomen slightly longer than thorax, brown.

Female face as wide as first antennal segment; antennal segments all short, second shortest, third about as wide as long, rounded. Hind tibia with a series of indistinct ventrals. Anal margin of wing slightly more prominent.

Holotype male, allotype female, five male and three female paratypes, on foliage in rain forest, near 100 km marker, Rt. 175 above Rio Valle Nacional; five male and one female paratypes, near Rio Valle Nacional, Oaxaca, Mexico, May 16–18, 1963. One female paratype, near Puerto Vientes above Pueblo Nuevo, Chiapas, Mexico, May 24, 1963. Holotype and allotype in the U.S. National Museum, others presently in the author's collection.

Neoparentia tarsalis sp. n.
(Figs. 7–10)

Male.—Length 2.0 mm; wing 2.2 mm by 0.9 mm.

Face long and very narrow, eyes contiguous near middle, face covered with whitish pollen; front dark metallic bluish with slight brownish pollen. Palpus dark. Antenna brown; first segment narrow, about as long as third; second shorter; third slightly longer than wide, bluntly pointed; arista basal.

Mesonotum metallic bluish green dulled with brownish pollen, more grayish on pleura; lower half of metapisternum yellow. Acrostichals reaching onto posterior slope.

Legs wholly yellow with mostly black setae, some pale setae on anterior surface of fore coxa and ventrally on femora. Middle tibia with an antero- and posterodorsal near basal third, anterodorsal and small ventral near distal third, four apicals; hind tibia with two strong anterodorsals, five or more prominent posterodorsals, four or five small ventrals, four apicals. Lengths of joints of fore tarsus

from base as 8-5-2-2-3, last three joints usually tightly folded; middle tarsus as 11-5-4-3-2; hind tarsus as 5-7-4-3-2.

Wing clear; third vein straight, fourth parallel with third for much of last part, bending slightly backward near tip; crossvein about two-thirds as long as last of fifth vein; anal margin slightly but distinctly rounded. Tip of calypter and its setae black; knob of halter pale brown.

Abdomen very slightly longer than thorax, brown with slight yellow on side of second tergite and venter.

Female face wider, as wide in middle as first antennal segment; antennal segments all short, second shortest, third about as wide as long, rounded. Ventrals of hind tibia more prominent, joints of fore tarsus not folded. Anal margin of wing slightly more prominent.

Holotype male, allotype female, six male and three female paratypes, on foliage in rain forest, above Rio Valle Nacional, Oaxaca, Mexico, May 14–16, 1962; two male and one female paratypes, same locality, Dec. 20–21, 1962; two male and two female paratypes, near 100 km marker, Rt. 175, Sierra Juarez above Rio Valle Nacional, Oaxaca, Mexico, May 17–18, 1963. One male paratype, near Puerto Vientes above Pueblo Nuevo, Chiapas, Mexico, May 24, 1963. Holotype and allotype in U.S. National Museum, others presently in the author's collection.

The slightly divergent tips of the third and fourth wing veins seem to indicate relationship to *Neoparentia deformis*, but that species has a much more deformed wing and lacks the modified fore tarsus in the male.

Neoparentia schildi sp. n.
(Fig. 11)

Male.—Length 2.5 mm; wing 2.7 mm by 1.0 mm.

Face long and narrow, gradually wider above, covered with grayish brown pollen; front metallic bluish with slight brownish pollen. Palpus dark. Antenna brown, first two segments rather yellowish; first segment narrow; second shorter and wider; third half again as long as wide, triangular, bluntly pointed; arista basal.

Mesonotum metallic bluish green dulled with brownish pollen; upper pleural surface brownish with gray pollen, lower pleural surface and metapisternum yellowish. Acrostichals reaching onto posterior slope.

Legs wholly yellow with mostly black setae, some pale setae anteriorly on fore coxa and ventrally on femora. Middle tibia with antero- and posterodorsal near basal third, anterodorsal and ventral near distal third, one or more rather slender anteroventrals near tip, four apicals; hind tibia with one anterodorsal, about four posterodorsals, two small ventrals, four apicals. Lengths of joints of fore tarsus from base as 9-4-3-2-2; middle tarsus as 11-5-4-2-2; hind tarsus as 6-8-5-3-2.

Wing slightly brownish tinged, rather pointed at tip of fourth vein; third vein straight, fourth vein slightly diverging from third near tip; crossvein two-thirds as long as last of fifth vein; anal margin slightly but distinctly rounded. Tip of calypter and its setae black; knob of halter very pale brownish.

Abdomen slightly longer than thorax, brown.
Female unknown.

Holotype male and one male paratype, Turrialba, Costa Rica, Nov. 1922. Two male paratypes, La Suiza, Costa Rica, one dated April, 1922. All collected by Pablo Schild and in the A. L. Melander collection in U.S. National Museum.

Though *Neoparentia schildi* provides the southernmost known record for the genus, other species will undoubtedly be found in South America.

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A LIST OF THE APHIDS OF CYPRUS

(Homoptera : Aphididae)

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During 1965 Dr. Harry G. Walker, while serving his last year as a FAO entomologist in Cyprus, made about 25 collections of aphids for me from this Island. These represented 14 species. An examination of Bodenheimer & Swirski's "Aphidoidea of the Middle East" (1957) showed that only 10 species of aphids had been recorded as occurring in Cyprus. Of these Walker had collected four species.

D. S. Wilkinson (1925 and 1926) published a few notes on Cyprus aphids as did also H. M. Morris (1937). These form the source of most of the statements of occurrence of aphids in Cyprus as given by Bodenheimer & Swirski. G. P. Georghiou (1957) published a "Catalog of Cyprus Insects" on pp. 5–5a of which he merely lists the names of 11 species of aphids. B. J. Wood (1963) published a note on *Toxoptera aurantii* (Fonscolombe) in Cyprus.

It occurred to me that the taxonomists in the British Museum (Natural History) may have determined aphids from Cyprus from time to

time and upon inquiry this proved to be so. Dr. V. F. Eastop and his associate, Mrs. C. A. Gosney, have been most kind in making available to me records of the slides of Cyprus aphids in their collection. Most of the individual collections are represented by only one slide but some by two or three slides and several by as many as six or seven. These total 84 collections representing 37 species (2 determined with a query) of which 49 (47%) collections are by George P. Georghiou, mostly in 1956.

Since so little has been published on the aphids of Cyprus it seemed to me to be desirable to make known all of the available information. Included herein are records of 47 species of aphids from 76 food plants. Some serious collecting should certainly reveal an appreciably greater number of aphids, especially if the higher altitudes of the Island were to be explored. Based on present information the aphids of Cyprus present few if any unusual features. About 65% of those here recorded are cosmopolitan or widely distributed and most of the remainder occur in other countries of the Middle East and usually elsewhere.

Abbreviations used in the text: B&S—Bodenheimer & Swirski; BM—British Museum (Natural History); GPG—George P. Georghiou; HMM—H. M. Morris; W—Harry G. Walker.

My thanks are due to Dr. Eastop and Mrs. Gosney, Department of Entomology. British Museum (Natural History) for suggestions and records, and to Miss Louise M. Russell, Entomology Research Division, ARS, U.S. Department of Agriculture for reviewing the manuscript of this paper.

List of Aphids

Acyrthosiphon pisum (Harris), pea aphid. Nicosia, 21.VI.37 on *Lathyrus* sp., HHM (BM); 17.IV.56 on lucerne, GPG (BM). Amurosios, 23.IV.56 a vagrant alata, GPS (BM). Famagusta, 20.IV.56 on alfalfa, W. Lyssi, 24.IV.65 and Argaki, 15.V.65, accidental on carrots, W.

Acyrthosiphon ?solani (Kaltenbach), foxglove aphid. Famagusta, 20.IV.66 on potato, W.

Anoecia sp. *?furcata* Theobald. Argaki, 15.V.65 accidental on carrots, W.

Aphis ?affinis DelGuercio. Pervolia, 20.IV.58 on *Mentha piperata*, GPG (BM).

Aphis craccivora Koch, cowpea aphid. All in BM except Lyssi; Nicosia, 27.IV.56 on *Robinia pseudoacacia*, GPG; 18.IV.56 on *Phaseolus* sp., GPG; Kouklia, 30.I.37 on *Medicago* sp., HMM. Deftera, 6.IV.56 on *Cicer arietinum*, S. Pieris. Kalochoria, 19.IV.56 on lucerne, GPG. Kiti, 20.IV.56 on cowpea, GPG. Lyssi, 24.IV.65 on carrots, W.

Aphis fabae Scopoli, bean aphid. B&S, p. 291 record this species (sensu latiori) as a major pest in Cyprus on *Vicia faba* and *Pisum sativum*. Morphou, 15.IV.65 on chard and Nicosia, 8.V.65 on *Chenopodium* sp., W.

The following in BM: Nicosia, 19.V.37 on *Chrysanthemum coronarium*, HMM; 12.IV.57 on *Tulipa* sp., GPG; 13.VII.37 on *Papaver somniferum*, HMM; 23.XII.35 on *Solanum* sp., HMM; 20.IV.54 on *Sonchus oleraceus*, GPG; 12.IV.56 on peas,

GPG; 12.IV.57 on celery, GPG; 20.IV.56 on *Pittosporum* sp., GPG. Amurosios, 23.IV.56 on *Tordylium cordatum*, GPG; 23.IV.56 on *Ferula communis*, 23.IV.56 on *Coriandrum sativum*, 23.IV.56 on *Urtica urens* and 23.IV.56 on *Silene* sp. (?accidental), GPG. Amurosios, 23.IV.56 on *Galium* sp., GPG. Ormidhia, 18.IV.56 on *Cnicus (Notobasis) syriacus* and on haricot beans, *Phaseolus vulgaris*, GPG. Mencou, 20.IV.56 on *Chrysanthemum coronarium* and 20.IV.56 on *Vicia faba*, GPG. Akanthou, 3.IV.56 on *Beta vulgaris*, S. Pieris. Pasalinni, 23,III.57 on spinach, M. Makrides. Pervolia, 8.XII.57 on *Beta vulgaris*, ?H.Nersat. Kiti, 20.IV.56 on *Beta vulgaris*, GPG. Epikititos, 27.IV.56 on artichoke, M. Makrides. Pergamas, 18.IV.56 on *Chrysanthemum coronarium*, GPG; 18.IV.56 on *Rumex pulcher*, GPG. Kowtraphos, 12.IV.56 on *Vicia faba*, GPG. Larnaca, 19.IV.56 on *Daucus* sp., GPG.

Aphis gossypii Glover, cotton or melon aphid. B&S, p. 294 report it is "sometimes injurious to cucumbers, melons, watermelons, cotton" in Cyprus. Lefka, 24.IX.65 a few apterae collected on watermelon and many in all stages on gourds, W. GPG (1957).

The following in the BM: Nicosia, 21.V.37 on *Lochia trichophylla*, HMM; 9.III.57 on *Capsella bursapastoris*, A. Ashiotis; 5.XII.35 on *Solanum* sp., HMM. Famagusta, 27.V.37 on *Cucumis* sp., HMM; 27.V.37 on *Pittosporum* sp., HMM and a collection prior to 27.IX.24 on *Gossypium* sp., D. S. Wilkinson. Deftera, 12.IV.57 on *Malva* sp., A. Ashiotis. Larnaca, 17.IV.56 on orange, GPG.

Aphis nerii Fonscolombe, oleander and milkweed aphid. Famagusta, 27.V.37 on *Nerium oleander*, HMM (BM). Nicosia, 18.IV.56 on *N. oleander*, GPG (BM).

Aphis pomi DeGeer, apple aphid. B&S, p. 299 report it as occurring on apple in Cyprus. GPG (1957) as *Doralis pomi* Deg.

Aphis punicae Passerini. B&S, p. 300 report it as occurring on *Punica granatum* in Cyprus. GPG (1957) as *Doralis punicae* Pass.

Aphis ?ruborum Boerner. No locality, circa 1925 on *Rubus* sp., D. S. Wilkinson (BM).

Alphis rumicis Linnaeus, dock aphid. GPG (1957) lists this as occurring in Cyprus but it is based on a misidentification.

Aploneura lentisci Passerini. Akrotiri Bay, 24, 25.XI.37 vagrant alatae, G. A. Mavroustakis (BM).

Baizongia pistaciae (Linnaeus). Kakopetria, 13.X.36 on *Pistacia terrebinthus*, HMM (BM).

Brachycaudus cardui (Linnaeus), thistle aphid. Ormidhia, 18.IV.56 on *Cnicus syriacus*, GPG (BM); 18.IV.56 on *Centaurea cyanus*, GPG (BM); 25.IV.56 on artichoke, M. Makrides (BM); V.1925 on artichoke, D. S. Wilkinson (BM). No locality, 7.XI.38 on artichoke, HMM (BM). Astromeritis, 12.IV.56 on *Carduus* sp., GPG (BM). Karavas, 6.V.65 on artichoke, W. Lyssi, 24.IV.65 accidental on carrots, W.

Brachycaudus helichrysi (Kaltenbach), plum leaf-curl aphid. Nicosia, 19.V.37 on *Centaurea* sp., HMM; 18.IV.56 on *Centaurea cyanus*, GPG; 3.V.65 on peach, W. Ay Amurosios, 23.IV.56 on *Cyanoglossum pictum*, GPG. All from BM except on peach.

Brevicoryne brassicae (Linnaeus), cabbage aphid. B&S, p. 282 record it as occurring on cabbage, cauliflower and mustard in Cyprus. Kondea, 11.I.65 on cauliflower and Morphou, 22.X.65 on cabbage, W. Argaki, 15.V.65 accidental on carrots, W.

In BM: Famagusta, 19.XI.56 and Kondea, 25.IV.56 on cauliflower, GPG. Vatili, 17.IV.56 on *Sonchus asper*, GPG. Nicosia, 20.IV.56 on *Brassica nigra*, GPG. GPG (1957).

Callaphis juglandis (Frisch). (Goeze). Akrotiri Bay Marshes, 24.X.56 no plant given, G. Mavromoustakis (BM). This species has formerly been placed in *Callipterus, Chromaphis* and *Panaphis*. Its food plant is *Juglans regia*. GPG (1957) as *Chromaphis juglandis* (Goeze).

Capitophorus elaeagni (Del Guercio). (= *C. braggii* (Gill.)), oleaster thistle aphid. Nicosia, 25.IV.56 and Epikititos, 27.IV.56 on artichoke, M. Makrides, (BM). Astromeritis, 17.IV.56 on *Carduus* sp., GPG (BM). Kondea, 24.XI.65 on artichoke, W.

Cavariella aegopodii (Scopoli), Lyssi, 24.IV.65 and Argaki, 16.V.65 on carrots, W.

Cinara pini (Linnaeus). (= *C. nuda* DeGeer). No locality, on "pine trees" D. S. Wilkinson (BM).

Dactynotus (Dactynotus) sonchi (Linnaeus). Ay Amurosios, 23.IV.56 on *Sonchus asper*, GPG (BM). No locality given, 15.XI.56 accidental on cauliflower, M. Makrides (BM). Lyssi, 24.IV.65, accidental on carrots, W.

Dysaphis crataegi (Kaltenbach). Platres, 24.XI.35 on *Daucus carota*, HMM (BM).

Dysaphis foenicula (Theobald). Ay. Amurosios, 23.IV.56 on *Ferula communis*, GPG (BM).

Dysaphis plantaginea (Passerini), rosy apple aphid. (= *Anuraphis rosea* Baker). B&S, p. 258 state that in Cyprus it is uncommon on apple and give it as *Sappaphis mali* (Ferrari). GPG (1957) as *Dentatus roseus* (Baker).

Eriosoma lanigerum (Hausmann), woolly apple aphid. B&S, p. 313 make the following statement as to this aphid in Cyprus: "*Aphalinus mali* (parasite of *Eriosoma lanigerum*) was introduced and liberated in 1936. Wilkinson found these aphids in an isolated apple orchard; apparently they had been introduced from England on apple stock. Common in the lower parts of Cyprus on the smaller number of trees growing there, it occurs also in the higher places without causing serious damage." GPG (1957).

Forda formicaria Heyden. Zakaki Meadows, 9.XII.37 no plant given, G. A. Mavromoustakis (BM).

Geoica utricularia (Passerini). Akhelia, 19.X.56 on *Pistacia* sp., GPG (BM).

Hyadaphis coriandri Das. Argaki, 15.V.65 on carrots, W (Eastop det).

Hyadaphis pseudobrassicae (Davis)—see *Lipaphis erysimi* (Kalt.).

Hyalopterus amygdali (Blanchard). Pissouri, 2.IV.57 on almond, GPG (BM).

Hyalopterus pruni (Geoffroy), mealy plum aphid. B&S, p. 310 say about this aphid in Cyprus; "On *Prunus amygdalus* and *P. persica* curling the leaves, spring." GPG (1957) as *H. arundinis* F. Eastop in litt says these records may apply to *H. amygdali*.

Geoica utricularia (Passerini). Akhelia, 19.X.56 on *Pistacia* sp., GPG (BM). Ay. Amurosios 23.IV.56 GPG (BM).

Lipaphis erysimi (Kaltenbach), turnip aphid. Formerly *Hyadaphis pseudobrassicae* (Davis). Pergamas, 18.IV.56 on *Brassica nigra*, GPG (BM).

Longiunguis donacis (Passerini). Famagusta, 10.IV.57 on *Arundo donax* A. Ashiotis (BM).

Macrosiphoniella absinthii (Linnaeus). Mathaeva, 28.V.37 on *Artemisia* sp., HMM (BM).

Macrosiphoniella sanborni (Gillette), chrysanthemum aphid. Nicosia, 18.IV.58 on *Chrysanthemum* sp. and 1 aptera, accidental on *Centaurea cyanus*, GPG (BM).

Macrosiphum avenae (Fabricius), (= *M. granarium* (Kirby)), English grain aphid. Lyssi, 24.IV.65 and Argaki, 15.V.65, accidental on carrots, W. Morphou, 25.V.34 on *Triticum* sp. HMM (BM). Polis, 14.IV.56 on barley, GPG (BM). Varili, 17.IV.56 on wheat, GPG (BM).

Macrosiphum fragariae (Walker). Ay. Amurosios, 23.IV.56 on *Silene* sp. and *Cynoglossum pictum*, undoubtedly accidental GPG (BM).

Macrosiphum rosae (Linnaeus), rose aphid. Famagusta, 27.V.37 HMM (BM). Epikitos, 28.IV.56, M. Makrides (BM). Nicosia, 25.IV.56, GPG (BM). Polis, 14.IV.56, GPG (BM). Nicosia, 12.IV and 12.V.65, W.—all on *Rosa* sp.

Myzus persicae (Sulzer), green peach aphid. In BM: Nicosia, 27.IV.56 on *Robinia pseudoacacia*, 11.IV.57 on radish; 12.IV.57 on tulip; and 12.IV.57 on *Antirrhinum majus*, GPG (BM). Pergamas, 18.IV.56 and Mencou, 20.IV.56 on *Chrysanthemum coronarium*, GPG. Pergamus, 18.IV.56 on *Brassica nigra*, GPG. Deftera, 12.IV.57 on mallow, A. Ashiotis. No locality or date, on tobacco, D. S. Wilkinson.

Walker collection in 1965: Nicosia, 9.IV on *Carthamus tinctorius*; in regard to this collection Dr. Walker wrote on 29 Nov. as follows: "I do not know of any commercial plantings of safflower nor of any plants here now. The aphids sent you were collected in a very small experimental plot here on the Experimental Station grounds and they were rather abundant and undoubtedly caused some damage."

Pterochloroides persicae Cholodkovsky. No locality or date and no slide, envelope only, on plum, D. S. Wilkinson (BM). B&S, p. 248 record this aphid as occurring in Cyprus "on almond, apricot and plum." GPG (1957) as *Lachnus persicae* Chol.

Rhopalosiphum maidis (Fitch), corn leaf aphid. Famagusta, 31.VII.56 on *Zea mays*, GPG (BM).

Schizaphis graminum (Rondani), greenbug. Nicosia, 21.V.37 on *Triticum* sp., GPG (BM).

Sipha (Rungsia) maydis Passerini. Nicosia, 11.IV.38 on *Secale cereale*, HMM (BM).

Smynthurodes betae (Westwood), (= *Triphidaphis phaseoli* (Pass.). Limassoi, 10.III.38 on roots of *Vicia faba*, HMM (BM).

Thuleaphis amygdalinus (Schouteden). Formerly in *Brachycaudus*. Pissouri, 2.IV.57 on almond, GPG (BM). Nicosia, 3.V.65, 1 alata on peach, W, det Eastop with query.

Toxoptera aurantii (Fonscolombe), black citrus aphid. Larnaca, 17, 18.IV.56 on lemon and orange, GPG (BM). Lapithos, 8.VI.56 on *Citrus* sp., S. Pieris (BM). Morphou, 11.V.65 on *Citrus* sp., W. GPG (1957). B&S, p. 304 "on *Citrus* spp., common."

B. J. Wood (1963) gives the following notes: "Isolated ant-promoted colonies of this pest occur throughout the year on new growth. Numbers increase in spring but not to serious proportions except sometimes in orchards regularly sprayed with contact insecticides. The circumstances indicate that natural enemies

are effective in the maintainence of the pest below an economic level. Other factors, such as the ageing of the tender spring growth flush, no doubt continue to bring an end to the heavy springtime infestations. *T. aurantii* is attacked by numerous natural enemies."

List of Food Plants

Antirrhinum majus (common snapdragon)
Myzus persicae
Apium graveolens (celery)
Aphis fabae
Aphis gossypii
Artemisia spp. (wormwood)
Macrosiphoniella absinthii
Arundo donax (giant reed)
Longiunguis donacis
Beta vulgaris var. *cicala* (swiss chard)
Aphis fabae
Beta vulgaris (common beet)
Aphis fabae
Brassica sp. (mustard)
Brevicoryne brassicae
Brassica nigra (black mustard)
Brevicoryne brassicae
Lipaphis erysimi
Myzus persicae
Brassica oleracea acephala (cauliflower)
Brevicoryne brassicae
Brassica oleracea capitata (cabbage)
Brevicoryne brassicae
Capsella bursapastoris (shepherd's purse)
Aphis gossypii
Carduus sp. (thistle)
Brachycaudus cardui
Capitophorus elaeagni
Carthamus tinctorius (safflower)
Myzus persicae
Centaurea cyanus (cornflower)
Brachycaudus cardui
Brachycaudus helichrysi
Macrosiphoniella sanborni
Chenopodium sp. (goosefoot)
Aphis fabae
Chrysanthemum sp.
Macrosiphoniella sanborni
Chrysanthemum coronarium (crown-daisy chrysanthemum)
Aphis fabae
Myzus persicae
Cicer arietinum (gram chickpea)
Aphis craccivora
Citrullus vulgaris (watermelon)
Aphis gossypii
Citrus sp.
Toxoptera aurantii
Citrus limon (lemon)
Toxoptera aurantii
Citrus sinensis (orange)
Aphis gossypii
Toxoptera aurantii
Cnicus (Notobasis) syriacus
Aphis fabae
Brachycaudus cardui
Coriandrum sativum (coriander)
Aphis fabae
Cucumis melo (muskmelon)
Aphis gossypii
Cucumis sativa (cucumber)
Aphis gossypii
Cynara scolymus (globe artichoke)
Aphis fabae
Brachycaudus cardui
Capitophorus elaeagni
Cynoglossum pictum (houndstongue)
Brachycaudus helichrysi
Daucus sp. (carrot)
Aphis fabae
Dysaphis crataegi
Ferula communis (common giantfennel)
Aphis fabae
Dysaphis foeniculae
Galium sp. (bedstraw)
Aphis fabae
Gossypium sp. (cotton)
Aphis gossypii
Hordeum vulgare (barley)
Macrosiphum avenae
Lathyrus sp. (pea)
Acyrthosiphon pisum

Lochia trichophylla
Aphis gossypii
Malus pumila (apple)
Dysaphis plantaginea
Eriosoma lanigerum
Malva sp. (mallow)
Aphis gossypii
Myzus persicae
Medicago sp. (medic)
Aphis craccivora
Medicago sativa (alfalfa, lucerne)
Acyrthosiphon pisum
Aphis craccivora
Mentha piperata (peppermint)
?*Aphis affinis*
Nerium oleander (oleander)
Aphis nerii
Nicotiana tabacum (tobacco)
Myzus persicae
Papaver somnifera (opium poppy)
Aphis fabae
Phaseolus sp. (ornamental climbing bean)
Aphis craccivora
Phaseolus vulgaris (haricot bean)
Aphis craccivora
Aphis fabae
Pinus sp. (pine)
Cinara pini
Pistacia sp. (pistache)
Geoica utricularia
Pistacia terebinthus (pistache)
Baizongia pistaciae
Pisum sativum (pea)
Aphis fabae
Myzus persicae
Pittosporum sp.
Aphis fabae
Aphis gossypii
Prunus sp. (plum)
Pterochloroides persicae
Prunus amygdalus (almond)
Hyalopterus amygdali
Hyalopterus pruni
Pterochloroides persicae
Thuleaphis amygdalinus
Prunus armeniaca (apricot)
Pterochloroides persicae
Prunus persicae (peach)
Hyalopterus pruni
Thuleaphis amygdalinus
Punica granatum (pomegranate)
Aphis punicae
Pyrus malus (apple)
Aphis pomi
Dysaphis plantaginea
Eriosoma lanigerum
Raphanus raphanistrum (radish)
Myzus persicae
Robinia pseudoacacia (black locust)
Aphis craccivora
Myzus persicae
Rosa sp. (rose)
Macrosiphum rosae
Rubus sp.
?*Aphis ruborum*
Rumex pulcher (fiddleneck dock)
Aphis fabae
Secale cereale (rye)
Sipha maydis
Silene sp.
Aphis fabae
Solanum sp. (nightshade)
Aphis fabae
Aphis gossypii
Solanum tuberosum (potato)
?*Acyrthosiphon solani*
Myzus persicae
Sonchus asper (prickly sowthistle)
Brevicoryne brassicae
Dactynotus sonchi
Sonchus oleraceus (common sowthistle)
Aphis fabae
Spinacia oleracea (spinach)
Aphis fabae
Tordylium cordatum
Aphis fabae
Triticum sp. (wheat)
Macrosiphum avenae
Schizaphis graminum
Tulipa sp.
Aphis fabae
Myzus persicae
Urtica urens (dog nettle)
Aphis fabae

Vicia faba (broad bean)
Aphis fabae
Vigna sinensis (cowpea)
Aphis craccivora
Zea mays (corn)
Rhopalosiphum maidis

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STUDIES OF THE MEXICAN DELTOCEPHALINAE: A NEW GENUS, CONVERSANA, AND THREE NEW SPECIES

(Homoptera: Cicadellidae)*

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Several specimens belonging to three related species were collected in Mexico between 1930 and 1945 during a series of field trips. These are apparently all undescribed and belong to a new genus.

Conversana, n. g.

Type-species: *Conversana reversa* new species.

Rather small leafhoppers allied to *Atanus* and *Danbara*. Head a little broader than pronotum. Crown flat, produced and rounded, distinctly longer at middle than near the eyes, angled with front; anterior margin thick. Forewing with appendix, inner anteapical cell open basally, outer anteapical cell triangular and about half the length of the median anteapical cell. Male plates elongate, triangular; pygofer bearing a short apical spine; aedeagus with an apical process curved cephalad and an anterior, dorsally directed process curved caudally. Color yellow to pale brown with few markings. Forewings usually without color markings, veins inconspicuous.

Conversana conversa, n. sp.

(Figs. 1, 2, 3, 4)

Resembling superficially a dull colored specimen of *Atanus*, with few markings and with different head, wings, and genitalia as noted above. Length of male 4 mm, female 4.5 mm.

* This work was supported in part by the National Science Foundation (Grant NSF GB-2932).

Crown short, bluntly angled, about twice as wide between eyes at base as median length. Pronotum short and broad, less than twice the length of crown. Forewing venation simple, middle anteapical cell long, greatly constricted at middle.

Color: Male pale with darker markings. Crown yellow with a brown band just above and paralleling a narrow white margin. Face yellow unmarked. Pronotum tinted with pale yellow. Scutellum darker yellow. Forewings pale subhyaline, veins on basal portion yellowish, inconspicuous; veins on apical portion brown, conspicuous. Female usually darker in color, tinted with brown and yellow.

Genitalia: Female seventh sternum with posterior margin roundedly produced from lateral angles to a small, shallow, median U-shaped notch. Male plates long, exceeding pygofer, rather narrow and pointed at apex. Style rather broad, abruptly concavely notched on outer margin at two-thirds their length, the apical third slender, finger-like, pointed at apex and curved outwardly. Connective long and narrow. Aedeagus with a long, slender shaft which curves dorsally, then anteriorly and which is tapered to a slender, pointed apex. A narrow "S"-shaped process arises near base, it is broadened on the reverse curve then rapidly narrowed to form a slender, pointed apex which is directed caudally. Pygofer with a long, slender spine arising near base and curving dorsally almost to dorsal margin of pygofer.

Holotype male: Atencingo, Pueblo, Mexico, July 19, 1930, Dr. Alfonse Dampf. Allotype female: Tepotzlan, Morales, Mexico, Sept. 11, 1941, DeLong, Good, Caldwell, and Plummer. Paratypes: 4 males, same as allotype; 1 male and 1 female, Cuernavaca, Mor., Mexico, Oct. 21, 1941, K-84, DeLong, Good, Caldwell, and Plummer; 1 female, near Mexico City, May 25, 1938, A. Dampf. All types are in the DeLong Collection.

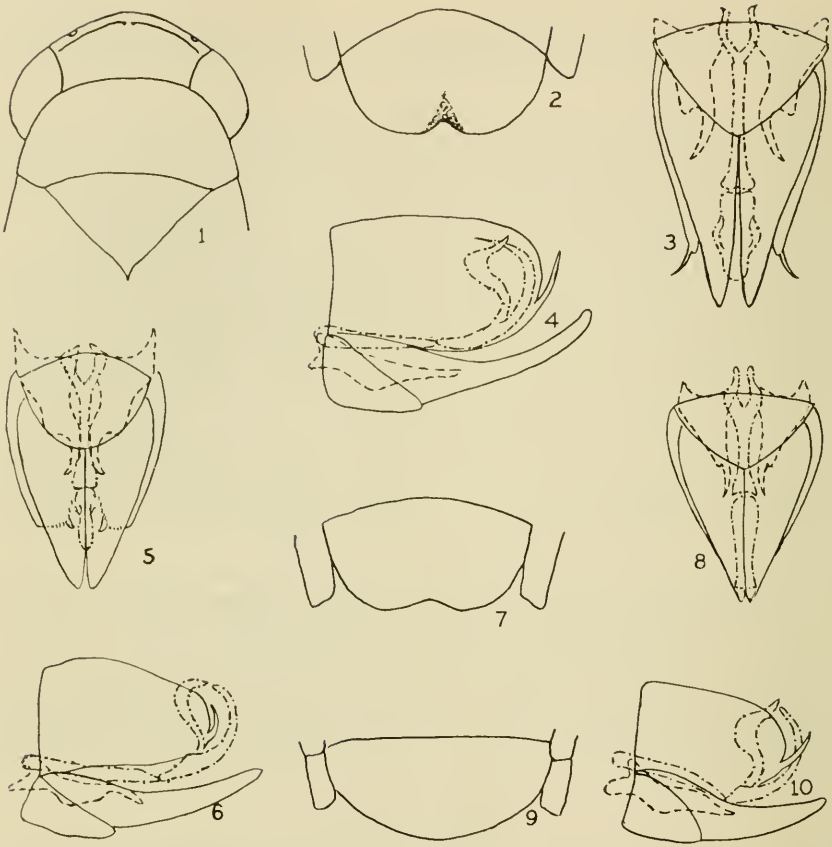
Conversana reversa, n. sp.
(Figs. 8, 9, 10)

Resembling *conversa* in form and appearance but larger with different coloration and male genital structures. Length of male 4 mm, female 4.5 mm.

Crown produced and bluntly angled, not quite twice as wide between eyes at base as median length.

Color: Mostly yellow. Crown with a narrow white marginal band enclosing ocelli, remainder of crown bright yellow. Face pale yellow. Pronotum and scutellum bright yellow, a narrow white median stripe extending from base of pronotum across scutellum, broadened on scutellum. Forewings dull yellowish, subhyaline, veins inconspicuous, claval margins white.

Genitalia: Female seventh sternum roundedly produced between the lateral angles. Male plates long, exceeding pygofer in length, apices pointed. Style triangular, slightly abruptly narrowed on outer margin at three-fourths its length to form a short, narrow, finger-like apex. Aedeagus with a long, slender tubular shaft which curves dorsally and anteriorly and is bluntly pointed. A basal process arises and extends dorsally, narrow at base, then abruptly broadened by a convexly curved anterior margin which continues to curve and forms a sharp-pointed apex, extending dorsally. The expanded portion is about three-times as wide as



Figs. 1–4, *Conversana conversa*, n. sp.: 1, dorsal view of head, pronotum, and scutellum; 2, female seventh sternum; 3, male genitalia, ventral view; 4, male genitalia, lateral view. Figs. 5–7, *C. angustata*, n. sp.: 5, male genitalia, ventral view; 6, male genitalia, lateral view; 7, female seventh sternum. Figs. 8–10, *C. reversa* n. sp.: 8, male genitalia, ventral view; 9, female seventh sternum; 10, male genitalia, lateral view.

the basal part. Pygofer with a long, slender pointed spine either side arising near base and extending dorso-caudally.

Holotype male: Hacienda de Santa Engracia, Mexico, Oct. 13, 1938, C. C. Plummer. Allotype, same data as holotype. Paratypes: 1 male and 12 females, same as holotype. All types in the DeLong Collection.

Conversana angustata, n. sp.
(Figs. 5, 6, 7)

Resembling *conversa* in general appearance but without the dark markings on the crown and with different male aedeagus. Length of male 4.5 mm, female 5.5 mm.

Crown produced and bluntly angled, not quite twice as wide between eyes at base as median length.

Color: Crown bright yellow with a marginal white area just above apex and a median white area at base. Pronotum dull gray to brown mottled with yellow. Scutellum yellow. Forewings appearing brownish subhyaline, veins inconspicuous. Paler colored specimens are yellowish with a slight darkening of the pronotum.

Genitalia: Female seventh sternum roundedly produced from lateral margins to a broad, shallow, median excavation which is about one-third the width of segment. Male plate three times as long as wide, apex bluntly pointed. Style rather broad, abruptly narrowed at two-thirds its length, by a concave excavation on outer margin forming a slender, finger-like apical portion on inner margin which is curved outwardly and tapered at apex. Connective long; aedeagus with a shaft which extends caudally and curves dorsally. A slender portion arises at the base and extends the length of shaft, curving cephalad then caudally. Pygofer with a short caudal spine on each side.

Holotype male: Hacienda de Santa Engracia, Mexico, October 13, 1938. Allotype female: same data. Paratypes: 8 males, same locality and date as holotype. All types are in the DeLong Collection.

NEW GENERIC RECORDS OF BETHYLIDAE FROM SOUTH AMERICA (HYMENOPTERA)

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This paper is a supplement to my recent Synopsis of the American Bethylidae (1964, Mus. Comp. Zool. Harvard, 132: 1–222). It concerns the first records from South America for two genera not previously reported from that continent. These two genera are *Aspidepyris*, previously known from a single specimen from Honduras, and *Parasclerodema*, previously known from Texas and Tamaulipas and also from warmer parts of the Old World. Also included is the first record of the genus *Apenesia* from Chile, this a member of a species-group not previously reported from south of the United States. This record is of special interest because the bethylid fauna of Chile appears to be extremely poor (four known species) despite rich faunas in neighboring countries.

Abbreviations of body parts are the same as those used in my Synopsis, but for the sake of ready reference the abbreviations are listed at the end of this paper.

[1] Part of a taxonomic survey of the American Bethylidae, supported by the National Science Foundation, Grant No. GB-1544.

Aspidepyris austrinus, n. sp.

Holotype.—♂, BRAZIL: Chapada (near Cuiabá, Mato Grosso), April (no collector stated, probably H. H. Smith) [U.S. Nat. Mus.].

Description of male type.—Length 3.7 mm; LFW 2.7 mm. Black, shining; mandibles testaceous; antennae light ferruginous; coxae fuscous; hind femora dark brown; legs otherwise light brown [front legs of type missing beyond coxae]; wings strongly, evenly fumose. Mandibles tridentate, the basal tooth broad, rounded; median lobe of clypeus broadly subangulate. First four antennal segments in a ratio of about 18:9:8:11, segment three 1.2 × as long as wide, segment eleven 1.7 × as long as wide. Head broad, WH 1.07 × LH; eyes strongly convergent below, WF 1.1 × HE; ocelli in a broad triangle, front angle much greater than a right angle, situated slightly above level of eye tops and close to vertex crest; OOL and WOT subequal. Vertex broadly rounded off a short distance above eye tops, slightly gibbous at the ocellar triangle. Front polished, very obscurely alutaceous, with small but sharply defined punctures which are separated by 2–4 × their own diameters except more widely spaced on the vertex. Thoracic dorsum shining, obscurely alutaceous, with small, somewhat irregular distributed punctures. Pronotal disc about 1.7 × as wide as its median length, with prominent anterior angles, its side-ridges convergent behind but discontinuous at the posterior margin, which is arcuately concave. Notauli wide, tear-drop shaped on posterior half of mesoscutum, separated by slightly more than their own greatest width; scutellar pits large, subcircular, slightly longer than wide, separated medially by about their own greatest diameter. Propodeum short, the disc measuring 1.5 × as wide as long; disc with three widely spaced discal carinae between which it is weakly transversely ridged; sides of disc finely transversely striolate, the lateral carinae paralleled by a groove; sidepieces with coarse, oblique striae. Mesopleurum polished, with a very large, deep pit just below the tegulae, characteristic of the genus, and a smaller but nevertheless deep pit below the base of the hind wings; mesopleura otherwise with a rather complex arrangement of ridges and foveae.

Paratype.—♂, BOLIVIA: Mapiri, La Paz Prov. (Staudinger) [Berlin Mus.].

Variation.—The paratype is smaller (LFW 2.3 mm) and has somewhat darker appendages, the scape and apical half of the flagellum being suffused with dark brown, the legs wholly dark brown except the tarsi lighter; the wings are uniformly fumose as in the type. There are no important differences from the type in standard ratios, but the punctures of the front are notably weaker and the striae on the propodeal side-pieces are much less coarse.

Remarks.—The paratype was collected about 800 miles from the type locality, and it seems probable that the differences noted above represent geographic variation in one species. These two specimens differ from the only other known specimen of this genus, the type of *foveolatus* Evans, from Honduras, in the following respects: (1) the dorsal shield of the pronotum is not prolonged arcuately backward over the mesoscutum, but stops at the slightly concave margin of the

pronotum; (2) the vertex is not nearly so strongly arched above the eye tops; and (3) the wings are more strongly suffused with brown. Aside from the difference in the pronotum, this species fits the generic description well.

Parascleroderma pucallpa, n. sp.

Holotype.— ♀, PERU: Linguistic Camp, Pucallpa, Loreto Prov., emerged 3 Nov. 1959, soft bark culture, egg parasite *ex* small *Oligembia* colony (E. S. Ross) [Calif. Acad. Sci.].

Description of female type.—Length 2.0 mm; LH .40 mm; LT .65 mm; wings and tegulae completely absent. Body strongly depressed, shining, without conspicuous setae except for a few toward the apex of the abdomen. Head castaneous, fading to testaceous in front of eyes, including clypeus and mouthparts; first two antennal segments testaceous, antennae otherwise dull, light ferruginous; entire thorax, propodeum, and legs testaceous; abdomen castaneous (distinctly darker than thorax and much like the head), testaceous at extreme base and apex and with some indistinct banding of this color. Mandibles with two sharp apical teeth and a much smaller tooth basad of these; palpi terminating in long bristles, as is characteristic of the genus; clypeus broadly rounded apically, with a strong median ridge. Head very thin, as seen from in front barrel-shaped, with evenly convex sides and a very weakly concave vertex. Eyes small, elliptical, grayish, each with about ten facets; eyes removed from mandibular bases by about .6 their own height, removed from vertex crest by nearly 4 × their own height; distance between eyes 3.5 × HE; WH .72 × LH. Scape slender, more than 3 × as long as wide; first four antennal segments in a ratio of about 12:4:2:3, segments three and eleven not longer than wide. Front shining, very weakly alutaceous, with small, very widely spaced punctures. Structure of thorax and propodeum very much as figured for *P. carinata* Evans (1964, op. cit., fig. 16) except basal carina of propodeum completely absent; entire surface of thorax and propodeum very weakly alutaceous; propodeum 2.5 × as long as its maximum width, maximum width 1.25 × minimum width. Abdomen elongate, fusiform, with a very short petiole.

Remarks.—This species agrees well with the generic characters of *Parascleroderma* and differs only slightly from the other two known American species, *carinata* Evans (Tamaulipas, Mexico) and *insolita* Evans (Brownville, Texas). It differs in color from either of those species and is slightly smaller and has fewer facets in the eyes. It also differs from *carinata* in sculpture of the propodeum and from *insolita* in shape of the clypeus.

It should be noted that other species of *Parascleroderma* are known to attack beetle larvae, so the record of this species attacking embiid eggs should be regarded with caution.

Apenesia chilena, n. sp.

Holotype.— ♂, CHILE: Pichinahuel, Cord. Nahuelbuta, Arauco, 20–28 Jan. 1959 (L. Peña) [Canad. Nat. Coll.].

Description of male type.—Length 4.0 mm; LFW 3.5 mm. Body dark castaneous, head and abdomen suffused with black and considerably darker than thorax; mandibles dull ferruginous; antennae wholly medium brown; legs wholly light brown; wings lightly tinged with brownish. Mandibles short and broad, terminating in five sharp teeth in almost a straight line; clypeus short, broadly rounded except with a median tooth at the terminus of the high, strongly arching median carina. First four antennal segments in a ratio of about 24:9:11:13, segment three 2.5 × as long as wide, segment eleven 3 × as long as wide; flagellar setulae pale, erect, bristling, nearly as long as width of flagellum. Eyes glabrous, protruding strongly from sides of head; WH 1.05 × LH. Front narrow, WF subequal to HE; front with a median groove which becomes gradually deepened toward the anterior ocellus. Ocelli somewhat enlarged, DAO .22 × WF; OOL .85 × WOT; front angle of ocellar triangle slightly exceeding a right angle. Vertex broadly rounded off far above eye tops, distance from eye tops to vertex crest nearly equal to HE; occipital carina visible across vertex in full frontal view. Front shining, weakly but uniformly alutaceous, obscurely punctate. Thorax and propodeum strongly depressed, the dorsal surface relatively broad and flat; pronotum very short, strongly sloping, without a transverse carina; mesoscutum strongly shining medially, but more strongly alutaceous laterad of the notauli, which are strongly impressed on the anterior two-thirds, absent behind. Propodeum elongate, with a strong median carina on the basal half; disc rounding off to the declivity, with no evidence of a transverse carina here. Mesopleurum shining, weakly alutaceous, the callus not well differentiated. Fore wing with the transverse median vein sloping strongly, the discoidal vein arising almost half way down on the transverse median vein; discoidal vein well pigmented, in fact traceable almost all the way to the wing margin. Abdomen sessile although very slender basally, somewhat depressed. Subgenital plate broadly truncate apically. Genitalia with the parameres elongate, nearly parallel-sided; apical volsellar structures short, without special modifications; aedoeagus moderately broad, complex, with small, paired median projections which slightly exceed the lateral elements.

Remarks.—This species presents an unusual combination of features. Basically it is most similar to *exilis*, from the southwestern United States, although the wings are most like those of *laevigata*, the genitalia not dissimilar to some members of the *columbana* group. I would tentatively include it in the *exilis* group, although some of the resemblances may be the result of convergence, since these appear to be nocturnal wasps. Although several nocturnal *Apenesia* occur in Argentina (e.g., *photophila* Ogloblin), these species do not resemble *chilena* closely and belong to other species-groups.

Alphabetical List of Abbreviations Used in Text

DAO: diameter of anterior ocellus. HE: height of eye (maximum, lateral view). LFW: length of fore wing. LH: length of head (apical margin of clypeus to median vertex crest). LT: length of thorax (pronotal collar to apex of propodeum). OOL: ocello-ocular line (minimum distance from eye to lateral ocellus). WF: width of front (measured at its minimum point). WH: width of head (maximum, including eyes). WOT: width of ocellar triangular (including lateral ocelli).

SYNONYMS OF TRACHYMYRMEX BUGNIONI FOREL AND TRACHYMYRMEX DIVERSUS MANN

(HYMENOPTERA: FORMICIDAE)

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Biological information being accumulated on several rare *Trachymyrmex* species justifies the following synonymy in order to use more valid names. Earlier synonymy in the genus appeared in 1958 (Weber, Ent. News 69:49–55).

Trachymyrmex bugnioni Forel

1912. *Trachymyrmex bugnioni* Forel, Mém. Soc. Ent. Belg. 19:186–187.
1916. *Trachymyrmex humilis* Wheeler, Bull. Mus. Comp. Zool. Harvard 60:325–326. **New synonymy.**
1922. *Myrmicocrypta cucumis* Mann, Proc. U. S. Nat. Mus. 61:45. **New synonymy.**
1925. *Trachymyrmex abortivus* Wheeler, Arkiv f. Zool. 17A:40–42. **New synonymy.**
1938. *Trachymyrmex schomburgki* Weber, Rev. de Ent. 9:195–196. **New synonymy.**
1938. *Trachymyrmex tucuche* Weber, Rev. de Ent. 9:197–199. **New synonymy.**
1940. *Trachymyrmex morgani* Weber, Rev. de Ent. 11:421–422. **New synonymy.**
1958. *Trachymyrmex cucumis* Weber, Ent. News 69:50–51.

The Forel collection contains one pin with two workers labelled "Typus" and "A (Trachymyrmex) Bugnioni ☿ Type, Forel, Burithaka, Colombie (Forel)". They have thorax lengths of 0.94 and 1.04 mm. When compared directly with a *morgani* cotype of Barro Colorado Island, Canal Zone, the latter had the median anterior clypeal notch smaller and sharper, shorter scapes, longer prothoracic median spines and thorax generally spinier. Where *bugnioni* has a massive bituberculate swelling on the epinotum anteriorly, *morgani* has a spine. Despite these differences, they will probably be considered infraspecific when more specimens are collected. *T. carib* and *levis* were also compared directly and considered to be close but distinct species.

There are two pins in the Museum of Comparative Zoology collection under *humilis*; one worker marked type (No. 9250) is labelled "Port of Spain, Trinidad, R. Thaxter 1913". It has a thorax length (including collar) of 1.05 mm. The other worker marked cotype (also No. 9250) is labelled "Gasparee Isl. Trinidad, on coral rocks, R. Thaxter 1912". It has a thorax length of 1.15 mm. In the original description Gasparee Island is mentioned first and the length given as 2.2–2.5 mm. Contrary to the description, the post-petiole from above is clearly broader than long in both specimens, even when the lateral tubercles were disregarded. No comparison with any other species was made in

the description. The differences between these ants and the other types are minor.

The holotype of *abortivus* of British Guiana when compared with the holotype of *schomburgki* (also British Guiana) in the Museum of Comparative Zoology in 1958 was decided to be conspecific, a decision in which Dr. W. L. Brown concurred. They had identical thoracic lengths. The differences noted in the original description of the latter are now considered to be infraspecific in value. The *abortivus* specimen is labelled "Kartabo, B.G. July 21, 1920 (Nos. 193–195)".

The holotype of *schomburgki* was compared in the United States National Museum with the two cotypes of *cucumis* of Honduras. The latter had the same thorax length, the clypeal notch deeper, the carinae and brown spot of the frons more prominent, the epinotal basal surface lower and the antero-lateral pronotal spine shorter. These are all considered now to be of infraspecific value.

At the time *tucuche* was described it was stated that it, *humilis* and *abortivus* "might be considered forms of a single species" and the recent comparisons with other type material, in the light of variability in other *Trachymyrmex* species, have forced the present conclusions.

The distribution, then, of *bugnioni* parallels remarkably the distribution of *cornetzi* of which it is a miniature (see Weber, 1958, Ent. News, 69: 49–50).

Trachymyrmex diversus Mann

1916. *Trachymyrmex diversus* Mann, Bull. Mus. Comp. Zool. 60:454–455.
1937. *Trachymyrmex phippsi* Weber, Rev. de Ent. 7:405–407. **New synonymy.**

Three cotypes of *diversus* in the United States National Museum are labelled "Rio Madeira, Abuna, Brazil, Mann and Baker". They are largely concolorous and distinctly paler than cotypes of *phippsi* from the Oronoque R., Lat. 2°42′ N., B. Guiana, the posterior mesonotal spines are smaller and there are other minor differences, all now considered to be intraspecific in value. The *diversus* workers were said to be closely related to *oetkeri* "but differing in the smaller size of the anterior pronotal spines, which in *T. oetkeri* are much longer than the posterior pair". Syntypes of *oetkeri* (Bresil, S. P., Ypiranga, Luederwalt) in the Santschi collection were compared with *phippsi* cotypes and found to be a different species.

A NEW SUBGENUS FOR LEUCOPIS LUTEICORNIS MALLOCH, A PREDATOR ON MEALYBUGS IN INDIA

(Diptera; Chamaemyiidae)

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McAlpine (1960) transferred *Leucopis (Neoleucopis) luteicornis* Malloch to the subgenus *Leucopomyia* Malloch although it was an exception therein in possessing ocellar bristles. I have examined material reared from larvae feeding on *Rastrococcus iceryoides* (Green) at Delhi, India, other specimens reared from larvae feeding on *Pulvinaria* sp. on *Swietenia Mahagoni* Jacq. at Bangalore, India, one specimen with no other data than "Ceylon (Koebele)," and a topotypical paratype (all in the U.S. National Museum). These all show that the basal crossvein of the wing (part of vein M_{3+4}) is completely lacking, a condition so far known among genera and subgenera related to *Leucopis* only in *Melaleucopis* Sabrosky. The ocellar bristles of *L. luteicornis* are much as in the type of the subgenus *Neoleucopis*, *L. pinicola* Malloch, well-developed reclinate bristles situated approximately on ocellar diameter anterad of the anterior ocellus and slightly farther apart than the distance between the mesal margins of the posterior ocelli. The mesonotal brownish stripes are lacking in *L. pinicola*, leaving the mesonotum uniformly gray; in *L. luteicornis* and *L. pulvinariae* Malloch (type of subgenus *Leucopomyia*), there is a pair of distinct brownish dorsocentral stripes (not "sublateral," as designated by McAlpine), somewhat broadened anteriorly and anterolaterally grading into the general gray color of the mesonotum. The considerations indicate that a new subgenus is required:

Indioleucopis, new subgenus of **Leucopis** Meigen

Lunule broadly exposed, furnished with fine whitish setulae; frons anteriorly deeply emarginate; frontal orbits without bristles; proscutellum present; costa attaining M; discal and second basal cells confluent; head, thorax, and abdomen densely gray pruinose; mesonotum with brownish dorsocentral stripes; mesopleuron bare; prescutellar acrostichal bristles well-developed; larvae associated with Pseudococcidae, Coccidae, and aphids.

Type species, *Leucopis luteicornis* Malloch.

The key to world genera of Chamaemyiidae by McAlpine (1960) may be modified as follows:

14. Thorax and abdomen subshining black; frontal orbit with a strong bristle; discal and second basal cells confluent, only a stub of a crossvein present ..... genus **Melaleucopis** Sabrosky

Head, thorax, and abdomen densely gray pruinose; discal and second basal cells separated, except in subgenus *Indioleucopis* ..... genus **Leucopis** Meigen 15

15. Mesopleuron with one or more bristles and/or setulae ..... subgenus **Leucopella** Malloch
Mesopleuron bare 16
16. Prescutellar acrostichal bristles present 17
Prescutellar acrostichal bristles absent 18
17. Mesonotum unicolorous; ocellar bristles present; larvae associated with adelgids; holarctic ..... subgenus **Neoleucopis** Malloch
Mesonotum with brown dorsocentral stripes on gray background; ocellar bristles present or absent; larvae associated with Pseudococcidae, Coccidae, and aphids 17a
17a. Ocellar bristles absent; discal and second basal cells separated; holarctic ..... subgenus **Leucopomyia** Malloch
Ocellar bristles present; discal and second basal cells confluent; India and Ceylon ..... subgenus **Indioleucopis** Steyskal

The complete synonymy of the species *Leucopis luteicornis* follows.

Leucopis (Indioleucopis) luteicornis Malloch, new status

Leucopis (Neoleucopis) luteicornis Malloch, 1924, Mem. Dept. Agric. India, Ent. Ser. 8 (7): 67; Ayyar, 1939, Jour. Mysore Agric. Exper. Un. 17 (4): 179; Le Pelley, 1943, Trans. Roy. Ent. Soc. London 93: 90; Puttarudria and Basavanna, 1957, Mysore Agric. Jour. 32: 12; ——— 1958, ibid., 32: 161.
Leucopis (Leucopomyia) luteicornis Malloch, McAlpine, 1960, Can. Ent. 92: 54.

In the original description, the species was stated to be parasitic upon "rain-tree mealy bug," *Rastrococcus* (as *Phenacoccus*) *iceryoides* (Green); Ayyar reported the species on the rice mealybug, *Ripersia oryzae* Green, in southern India; Le Pelley noted it on *Pseudococcus lilacinus* Cockerell in Coimbatore; Puttarudria and Basavanna in 1957 stated that it is "very commonly predaceous upon aphids and also on mealybugs of the genus *Pseudococcus*" (abundantly on various plants); and the same authors in 1958 listed the species in a chart as very common at Bangalore attacking *Aphis gossypii* Glover on cotton.

Reference

McAlpine, J. F. 1960. A new species of *Leucopis* (*Leucopella*) from Chile and a key to the world genera and subgenera of Chamaemyiidae (Diptera). Can. Ent. 92: 51–58.

A REVIEW OF THE SUBFAMILY HETERARTHRINAE IN NORTH AMERICA

(HYMENOPTERA: TENTHREDINIDAE)

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The subfamily Heterarthrinae in North America includes about 30 species in 12 genera and 3 tribes. Ross (1937) included 7 genera under the subfamily name Phyllotominae; however, since Ross' generic revision, a number of changes and additions have come about, and it seems worthwhile to review this subfamily and present a key for generic determination.

Many of the species included in the Heterarthrinae are economically important or potential pests as a result of their external or internal feeding habits in the larval stage on the foliage of various plants. The members of the tribe Caliroini are all external feeders, whereas the members of the Heterarthrini and Fenusini are all leaf-miners. The following chart gives a resumé of the known hosts:

Salicaceae	*Salix*	*Messa wuestneii* (Konow)
	Populus	*Messa populifoliella* (Townsend)
		Messa spp.
Betulaceae	*Betula*	*Heterarthrus nemoratus* (Fallén)
		Messa nana (Klug)
		Profenusa thomsoni (Konow)
		Fenusa pusilla (Lepeletier)
	Alnus	*Fenusa dohrnii* (Tischbein)
Fagaceae	*Quercus*	*Profenusa maineusis* Smith
		Profenusa lucifex (Ross)
		Profenusa inspirata (MacGillivray)(?)
		Caliroa spp.
	Castanea	*Caliroa* spp.
Ulmaceae	*Ulmus*	*Fenusa ulmi* Sundevall
Platanaceae	*Platanus*	*Bidigitus platani* (Burks)
Cornaceae	*Nyssa*	*Caliroa* sp.
Rhamnaceae	*Ceanothus*	*Caliroa* sp. (California)
Violaceae	*Viola*	*Nefusa auita* (MacGillivray)
Rosaceae	*Rosa*	*Endelomyia aethiops* (Fabricius)
	Rubus	*Metallus capitalis* (Norton)
		Metallus rohweri MacGillivray
	Crataegus	*Profenusa canadensis* (Marlatt)
	Potentilla	*Fenella nigrita* Westwood
	Prunus	*Setabara histrionicus* (MacGillivray)(?)
		Caliroa spp.
		Caliroa cerasi (Linnaeus)
	Pyrus	*Caliroa cerasi* (Linnaeus)
	Cotoneaster	*Caliroa cerasi* (Linnaeus)
Aceraceae	*Acer*	*Caliroa* sp. (California)

All references to original descriptions, except for those taxa new to North America, are given in the Hymenoptera of America North of Mexico, Synoptic Catalog (Ross, 1951) or its First and Second Supplements (Burks, 1958, 1967) and are not repeated here. Specimens may be keyed to this subfamily by using Ross' 1937 key to the subfamilies of Tenthredinidae.

Key to Nearctic Genera

1. Fore wing with vein 2A and 3A complete for its entire length, connected to 1A by an oblique cross-vein (Ross, 1937, figs. 203, 205) 2
   Fore wing with anal cell petiolate, basal section of vein 2A and 3A atrophied with only basal stub present or curving up to meet 1A and forming a small basal cell (Ross, 1937, figs. 200, 207, 209); Fenusini 4
2. Antenna with 10 or more segments; tarsal claw with 2 subequal outer teeth and a large, acute basal lobe; head markedly depressed between eyes (Ross, 1937, fig. 252); Heterarthrini ..... **Heterarthrus** Stephens
   Antenna with 9 segments; tarsal claw with 1 outer tooth and a large acute basal lobe; head convex between eyes (Ross, 1937, fig. 251); Caliroini 3
3. Apical 4 antennal segments not reduced, segments beyond 2nd gradually decreasing in length; basal emargination of anal cell of fore wing with a short basally projecting spur (Ross, 1937, fig. 203); anal cell of hind wing petiolate ..... **Endelomyia** Ashmead
   Apical 4 antennal segments reduced in length, together only slightly longer than 3rd segment; basal emargination of anal cell of fore wing without a spur; anal cell of hind wing sessile or with a very short petiole ..... **Caliroa** O. Costa
4. Hind wing with cell R_1 open at apex (Ross, 1937, fig. 259) 5
   Hind wing with cell R_1 closed at apex (Ross, 1937, fig. 258) 10
5. Antenna with 10 or 11 segments ..... **Fenella** Westwood
   Antenna with 9 segments 6
6. Tarsal claw with 1 or 2 outer teeth and a large acute basal lobe (figs. 3, 4); fore wing with stub of 2A and 3A straight; hind wing with anal cell present or absent 7
   Tarsal claw simple or with a small inner tooth, basal lobe absent (fig. 5); fore wing with stub of 2A and 3A curved up and meeting 1A, forming a small basal cell; hind wing with anal cell absent 9
7. Prepectus present ..... **Nefusa** Ross
   Prepectus absent 8
8. Tarsal claw with a single outer tooth (fig. 3) ..... **Profenusa** MacGillivray
   Tarsal claw with 2 subequal outer teeth (fig. 4) ..... **Bidigitus**, n. g.
9. Fore tarsus subequal in length to fore tibia; antenna short with 3rd segment longer than 4th segment ..... **Fenusa** Leach
   Fore tarsus at least 1½ times or more the length of fore tibia; antenna long and slender, with 3rd and 4th segments subequal in length ..... **Prolatus**, n. g.
10. Tarsal claw with a small, indistinct basal lobe at base, appearing simple (fig. 6) ..... **Setabara** Ross
    Tarsal claw with a large, acute, distinct basal lobe (fig. 3) 11

11. Second antennal segment wider than long; 3rd and 4th segments usually subequal in length ..... **Metallus** Forbes
Second antennal segment longer than wide; 3rd segment usually longer than 4th segment ..... **Messa** Leach

CALIROINI

Endelomyia Ashmead

The single species in this genus, *E. aethiops* (Fabricius), is an external feeder on the foliage of wild and cultivated roses in the larval stage and is widespread in North America. This species has the approved common name "rose-slug", although the larvae are more typically sawfly-like in appearance as opposed to the slug-like appearance of the larvae of *Caliroa*. It was apparently introduced from Europe.

Caliroa O. Costa

This genus is presently being revised by the author. There are about a dozen species in North America, all of which are external feeders on the foliage of various plants. The hosts include many Rosaceae (pear, peach, cherry) as well as *Quercus*, *Nyssa*, *Castanea*, and possibly *Ceanothus* and *Acer*. The adult of the most common species, *C. cerasi* (Linnaeus), also known as the "pear-slug", may be separated from all other members of this genus by its entirely black hind legs. All of the other North American species have at least some white on the basal part of the hind tibia.

HETERARTHRINI

Heterarthrus Stephens

The only North American species in this genus, *H. nemoratus* (Fallén), was introduced from Europe. This species is common in the Northeast where it is occasionally important due to its habit of mining in leaves of *Betula*.

FENUSINI

NEFUSINI, **new synonymy.**

All of the members of this tribe are leaf-miners in the larval stage, and the adults may be separated from the other 2 tribes by the petiolate anal cell of the fore wing. Ross (1951) proposed a new tribe, Nefusini, for the monotypic genus *Nefusa*, separated from the Fenusini by the presence of a prepectus. *Nefusa* is very close to the genus *Profenusa* except for this one character, and, in my opinion, it is not distinct enough to warrant placement in a separate tribe. Although the single species of *Nefusa* is the only species of this subfamily in North America to have a prepectus, the European genus *Parna* also has this character and is also placed in this subfamily and tribe.

Metallus Forbes

There are 2 species in this genus in North America, both of which are leaf-miners of *Rubus*. The following key will separate these species:

Wings lightly and uniformly infuscate; thorax partly rufous or entirely black; legs at least with tibia black; eastern North America ..... **rohweri** MacGillivray
Wings hyaline; thorax entirely black; legs entirely yellow; transcontinental ..... **capitalis** (Norton)

Messa Leach

There are 3 or 4 species in North America. *M. populifoliella* (Townsend), a generally pale-colored species, and 1 or 2 other dark-colored species are leaf-miners of *Populus*. *M. wuestneii* (Konow), a Holarctic species and known in North America only from Alaska and Northwest Territories, is a leaf-miner of *Salix*. Additional series of members of this genus will be needed before a revision is attempted; however, a new record for North America for a European species is given below.

Messa nana (Klug)

Tenthredo nana Klug, 1814, Mag. Gesell. Naturf. Freunde Berlin 8: 73.

This species is quite distinct from all other members of this genus in North America and may be separated by the distinct ridges on the head enclosing an ocellar basin and supra-antennal basin, the lack of surface sculpture on the lobes of the mesonotum, the slender antenna, and the black coloration with the labrum, upper angles of the pronotum, tegula, extreme base of each femur, and each tibia and tarsus whitish. It appears indistinguishable from the European specimens I have examined.

The North American records for this species are as follows: MAINE: Scarsboro, 4 June 1966, L. J. Lipovsky (2 ♀ ♀); Scarsboro, 11 June 1967, on birches in nursery, D. R. Smith (11 ♀ ♀). NEW YORK: Oswego Co., Oswego Township, from sticky board trap in pear orchard, June 3, 1966, R. W. Stelle (2 ♀ ♀).

Profenusa MacGillivray

Smith (1966) gave a key to the 6 North American species in this genus. *P. platani* Burks was included in that key; however, a new genus is described in this paper for this species. The 5 species now considered to belong in this genus are leaf-miners of *Quercus*, *Betula*, and *Crataegus*. *P. lucifex* (Ross) had been known only from the type specimen from Illinois, but, recently, I have seen additional specimens which were reared from red oak in Maine and from bur oak in Ontario.

Bidigitus, n. g.

Type-species.—*Profenusa platani* Burks.

Description.—Antenna with 3rd segment longer than 4th segment; 2nd segment

longer than wide. Prepectus absent. Fore tarsus subequal in length to fore tibia. Fore wing with vein 2A and 3A straight at apex. Hind wing with cell R_1 open; anal cell present, with petiole much longer than cell. Tarsal claw with 2 long subequal outer teeth and a large acute basal lobe.

This genus is close to *Profenusa* but differs by the unique tarsal claw and the short anal cell of the hind wing. In *Profenusa*, there is a single outer tooth on the tarsal claw, and the anal cell of the hind wing, when present, is much longer than its petiole. The genitalia of this species are also quite different from those of *Profenusa*.

The single species in this genus, *platani*, is a leaf-miner of *Platanus racemosa*, and it is known only from southern California.

Nefusa Ross

The single species in this genus, *N. anita* (MacGillivray), is known only from the eastern United States, where it is a leaf-miner of *Viola*. This species is unique in that it possesses a prepectus, a character absent in all other North American Heterarthrinae and present only in the European genus *Parna*: otherwise, it is close to *Profenusa*. Although rarely collected, it was plentiful in Malaise trap collections in Maryland.

Setabara Ross

The one species in this genus, *S. histrionicus* (MacGillivray), is known only from the western United States. All that is known of its biology is that a good series of adults was collected from *Prunus* at Talent, Oregon by L. G. Gentner. This species is probably a leaf-miner. The closed cell R_1 of the hind wing and the simple tarsal claw with an indistinct basal lobe will separate this genus from others of this tribe.

Fenella Westwood

Fenella Westwood, 1840, Introd. Mod. Class. Ins. 2: 54.
Type-species.—*Fenella nigrita* Westwood. Monotypic.

Fenella nigrita Westwood

Fenella nigrita Westwood, 1840, Introd. Mod. Class. Ins. 2: 54.

This is the first record of this species and genus for North America, and its discovery must be attributed to Dr. H. E. Milliron of the Entomology Research Institute, Canada Department of Agriculture, Ottawa. The specimens Dr. Milliron obtained were reared from larvae which were mining leaves of *Potentilla* at Ottawa, Canada. Recently, I have also seen several specimens of this species from East Lansing, Michigan. The species may be separated from other North American Fenusini by its small size (2 mm. or less in length) and by its 10- or 11-

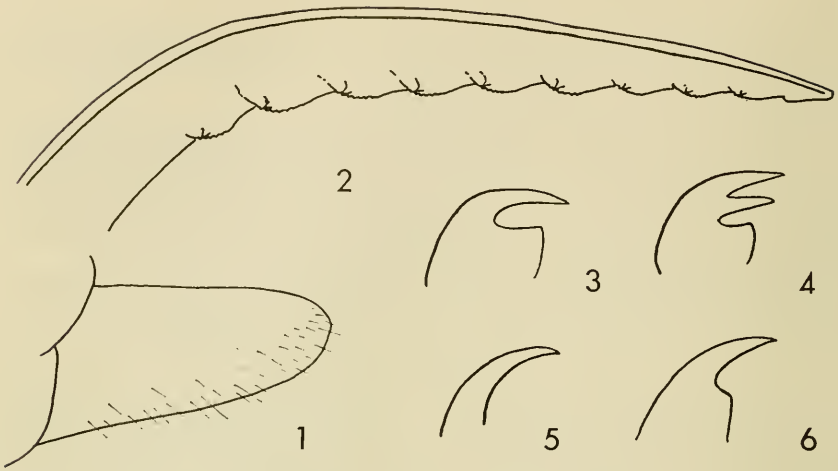

Fig. 1. *Prolatus artus*, n. sp., sheath. Fig. 2. *Prolatus artus*, n. sp. lancet. Fig. 3. *Profenusa canadensis* (Marlatt), tarsal claw. Fig. 4. *Bidigitus platani* (Burks), tarsal claw. Fig. 5. *Prolatus artus*, n. sp., tarsal claw. Fig. 6. *Setabara histrionicus* (MacGillivray), tarsal claw.

segmented antenna. The simple tarsal claws, absence of the anal cell in the hind wing, and the basal loop formed by vein 2A and 3A meeting 1A in the fore wing place this genus close to *Fenusa*.

Fenusa Leach

There are 3 species in this genus in North America. Benson (1951) gave a key to these 3 species and the following key is extracted from his.

1. Lateral lobes of mesonotum with fine surface sculpture; abdominal tergites dull with alutaceous surface sculpture; vein 2r of fore wing joins Rs before 3r-m; male rare; larva mines in leaves of *Ulmus*; eastern North America, probably introduced from Europe ..... **ulmi** Sundevall

   Lateral lobes of mesonotum and abdominal tergites smooth, without surface sculpture; vein 2r of fore wing joins Rs beyond 3r-m 2

2. Antenna longer than thorax; 3rd segment only 1½ times as long as 4th; at least segments 4 and 5 more than twice as long as broad; male unknown; larva mines in leaves of *Alnus*; transcontinental and Holarctic ..... **dohrnii** (Tischbein)

   Antenna shorter than thorax; 3rd segment twice as long as 4th; segments 4 and 5 less than twice as long as broad; males common; larva mines in leaves of *Betula*; eastern North America, California, Oregon, Utah, Washington, probably introduced from Europe ..... **pusilla** (Lepeletier)

Prolatus, n. g.

Type-species.—*Prolatus artus*, n. sp.

Description.—Antenna with 3rd segment subequal to or only slightly longer

than 4th segment; 2nd segment slightly longer than wide. Prepectus absent. Fore tarsus long and slender, 1½ times or more length of fore tibia; mid tarsus about 1½ times length of mid tibia; hind tarsus shorter than hind tibia. Fore wing with vein 2A and 3A curving up and meeting 1A, forming a small basal cell. Hind wing with cell R_1 open; anal cell absent. Tarsal claw simple, long and slender.

This genus is erected for the unique new species described below. It may be separated from other Heterarthrinae by the long, slender fore and mid-tarsi, the slender antenna with the 3rd and 4th segments subequal in length, simple tarsal claw, and the absence of the anal cell in the hind wing. It is apparently most closely related to *Fenusa*.

Prolatus artus, n. sp.

Female.—Length, 3.8 mm. Entirely black with clypeus, labrum, mandibles, tegula, upper angles of pronotum, extreme apex of each femur, and extreme base of each tibia light brown to whitish. Head and body, except for anterior and lateral lobes of mesonotum, covered with fine white hairs. Wings uniformly subhyaline.

Characters as for genus. Clypeus truncate; malar space linear; genal carina absent. Sheath slender, straight above and rounded below and at apex (fig. 1). Lancet as in fig. 2.

Male.—See discussion.

Holotype.—Female, Oregon, Jackson Co., 10 mi. N. W. Pinehurst, May 5, 1962, David R. Smith. USNM 69159.

Host.—Unknown.

Discussion.—I have seen one male which may be this species; however, it is associated only by general structure and collection localities (both from Oregon), and since the association is not definite, I hesitate to designate it as an allotype. The coloration of this male is similar to that of the female described except for the pronotum and tegulae, which are black. The fore and mid tarsi are also slightly longer in relation to the lengths of their respective tibia than those of the female. The data on this male are as follows: "Oregon, Benton Co., Scott's Hill, 1 mi. S. W. Corvallis, moss and ground litter, March 10, 1960, J. D. Lattin." It was undoubtedly collected from a Berlese sample.

One structural character not mentioned in the generic or specific description is the presence of a cross vein in the radial cell of the hind wing. This is extremely unusual and I know of no other sawflies with this extra vein. I am choosing only to mention this character since it may be an abnormality, a phenomenon very common in the wing venation of sawflies.

This species is immediately recognized from all other Fenusini by the long slender fore and mid tarsi and the simple tarsal claws.

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PARASITIC TROMBIDIID MITES ON DASYHELEA MUTABILIS (COQUILLETT)

(Diptera: Ceratopogonidae)

R. H. Whitsel *and* R. F. Schoeppner, *Biologists, San Mateo County Mosquito Abatement District, Burlingame, California*

On August 13, 1965, a male ceratopogonid was collected and subsequently noted to be parasitized by three mites. The male gnat was collected in an oak-woodland area within Santa Clara County, California.

Dr. Willis W. Wirth, Agricultural Research Service, United States Department of Agriculture, Washington, D.C., determined the host as *Dasyhelea mutabilis* (Coq.), a common Nearctic gnat. Dr. Irwin M. Newell, University of California at Riverside, identified the mite larvae as belonging to the genus *Valgothrombium*. Identified specimens have been retained by each specialist.

The position of the mites on the ceratopogonid is related in fig. 1. One mite was attached to the ventral side of the first abdominal segment between the sternite and hind coxa. Another mite was attached between the second and third abdominal sternite. A third mite was dislodged during transport. Newell relates that these mites frequent moist situations where they crawl over the substrate in search of prey. Presumably, the *Dasyhelea* was parasitized immediately following pupation. According to Newell, it is not uncommon that these mites locate the pupae of the host and await ecdysis before attachment.

Fig. 1. Valgothrombium mites attached to *Dasyhelea mutabilis*.

Apparently, trombidiid mites are associated with a wide variety of insects as related by the literature. Newell (P. C., 1966) has records of *Valgothrombium* on *Culicoides* (Diptera: Ceratopogonidae). Odhiambo (1957) noted a trombidiid mite associated with *Oxycarenus* (Hemiptera: Lygaeidae) while Davis (1961) reports *Allothrombium mitchelli* as a predator on the balsam woolly aphid (Homoptera: Aphididae). Salman (1929) records a *Trombidium* species feeding on the eggs of *Coleophora salmani* (Lepidoptera: Coleophoridae). Severin (1944) relates that a *Eutrombidium* species serves as a predator of grasshoppers (Orthoptera: Locustidae). Records of trombidiid mites associated with diptera of medical importance are presented in an annotated list by Jenkins (1964).

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PROTECTION OF INSECTS BEING TRANSPORTED IN LIQUID

At one time or another, most entomologists have had to try to work free without damaging them insects transported in liquid in vials into which wads or wisps of cotton had been inserted to protect the specimens against rubbing and breakage. The difficulties encountered in trying to separate the insects from the cotton are well known. To overcome the problems involved, at one time I tried substituting pieces of cloth for the cotton, thinking that one might be able to wash or float the insects from a single piece—but the result was just as bad or worse. Saran Wrap, however, can be used to protect the specimens and they are readily and quickly floated from the plastic.

Saran was tested in several solvents over a period of about six months to determine whether or not it might prove to be generally useful for this purpose, with the following results:

Solvent at full strength	*Effect on Saran*
95% alcohol	None evident.
xylol	No effect.
glacial acetic acid	No effect.
dioxane	Some dissolving of the Saran and the dioxane became slightly milky. Brittle after drying.
chloroform	No effect. Saran slightly stiffened after drying.
ammonia	No disintegration of the Saran but it became slightly browned. Saran flexible after drying.
ethyl acetate	No effect.

As a result of the tests and our experience with the Saran, we are routinely substituting it for cotton or cloth, inserting a crumpled ball of it into the vials.

Additional protection of specimens against mechanical damage may be obtained by placing them in more viscid media such as glycerine, or even heavy syrups like white Karo. Liquids of desired viscosity can readily be obtained by using methyl cellulose. When necessary, suitable agents, such as ethyl acetate, may be added to prevent decomposition. After they arrive at their destination specimens stored in such materials can easily be washed in water and then stored in alcohol.—R. D. SHENEFELT, *Department of Entomology, University of Wisconsin, Madison, Wisconsin 53706.*

DESCRIPTION OF A NEW GENUS AND SPECIES OF TRIMENOPONIDAE FROM PANAMÁ

(MALLOPHAGA)

EUSTORGIO MÉNDEZ, *Gorgas Memorial Laboratory, Panamá, R. P.*

The systematics of the family Trimenoponidae remains unsatisfactory. The group is comparatively small since only nine species are known, all of which are found in the American tropics associated mainly with rodents and marsupials. In his monograph, Werneck (1948) combines this particular group with the family Boopidae (found on mammals) and the families Ricinidae and Menoponidae (found on birds), in a single group, the family Ricinidae. However, this system of classification is not generally followed and many investigators consider the lice grouped in the family Trimenoponidae, as designated by Harrison (1915) and reviewed by Ferris (1922) as a separate, well-defined group restricted to mammal hosts.

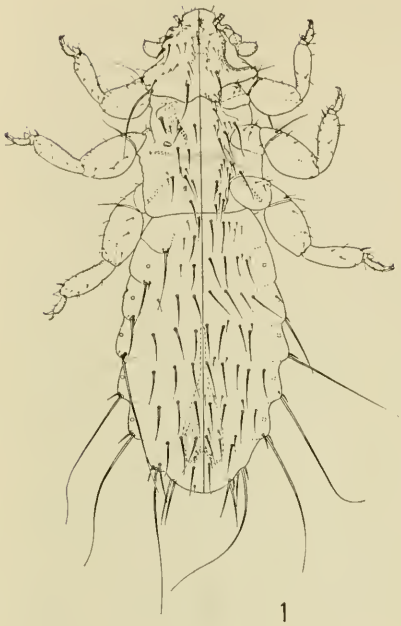
The most recent discussions regarding affinities and host-parasite relationships within the family Trimenoponidae have been presented by Hopkins (1949) and Vanzolini & Guimaraes (1955). To date this group contains five genera, namely: *Cummingsia, Chinchillophaga, Harrisonia, Philandesia* and *Trimenopon.* Recently Dr. Phyllis T. Johnson has kindly submitted to me for study specimens of Trimenoponidae that apparently belong to an unknown genus and species and form the basis for the present paper. This discovery bears out the statement of Emerson (1964) to the effect that more collecting from probable hosts in South America could enlarge the family.

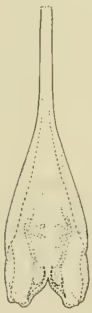
Hoplomyophilus, n. gen.

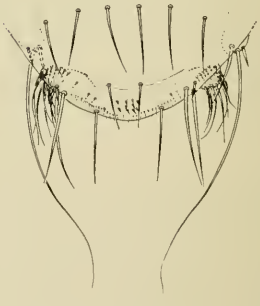
Generic diagnosis.—Trimenoponidae lacking spinelike processes on ventral side of head; with two lateral spiniform setae at level of antenna. Prothorax subquadrate, smaller than pterothorax; anterior thoracic stigmata conspicuous.

Hoplomyophilus can be readily separated from the other known genera, with the exception of *Philandesia* and *Trimenopon*, by the absence of spinelike processes on the ventral region of head. The new genus can be separated from the latter two genera by structural features of the head and thorax. The following differences are outstanding: In *Hoplomyophilis* the head has two conspicuous lateral spiniform setae at same level with antenna. These spiniform setae are absent in *Philandesia* and *Trimenopon.* In *Hoplomyophilus* the prothorax is subquadrate, smaller than pterothorax, whereas both *Philandesia* and *Trimenopon* have a trapezoidal prothorax which is larger than pterothorax.

Description.—Head without spinelike processes on ventral region; with lateral and posterior margins sinuate; posterior margin with central sinus; with two dorsal,







Figs. 1–4, *Hoplomyophilus nativus*, n. gen., n. sp.: 1, dorsal-ventral view of male holotype; 2, genitalia of male holotype; 3, dorsal-ventral view of female allotype; 4, genitalia of female allotype.

submarginal spiniform setae at the antennal level; clypeal region moderately produced, not limited by distinct suture; eyes absent; maxillary palpi four-segmented, exposed; antennae four-segmented, exposed, not protected ventrally by a flap; antennal fossae deep; temporal lobes slightly prominent, truncate. Prothorax and pterothorax fused, both subquadrate; anterior thoracic stigmata conspicuous; posterior thoracic stigmata reduced; sternal plates fused into a single plate. Legs short, stout; with distinct pulvilli on the first tarsal segment of all legs. Abdomen subovate, with five pairs of abdominal stigmata; male genitalia of simple type.

Type species.—*Hoplomyophilus nativus*, new species.

Affinities.—It is my opinion that *Hoplomyophilus* is closely related to the peculiar genus *Harrisonia* Ferris. Similarities are noticed particularly in the morphology of the thorax and abdomen. Among the most important features common to the two genera are the complete union of prothorax and pterothorax, the fusion of the thoracic sternal plates into a single plate and the conspicuous anterior thoracic stigmata. The fact that *Harrisonia* also parasitizes spiny rats, *Proechimys semispinosus* being its true host, seems to support this belief.

Hoplomyophilus nativus, n. sp.
(Figs. 1–4)

Description.—MALE (Figs. 1, 2). Head slightly wider than long, with clypeal region moderately produced, having anterior margin evenly convex, provided with minute and short marginal and submarginal setae. Lateral margins of head sinuate, slightly notched; each margin armed with two dorso-submarginal spiniform setae located at same level with the antenna. Posterior margin of head sinuate, with indentation at middle. Maxillary palpi four-segmented, exposed, with few short setae mostly concentrated on apical segment. Antennae four-segmented, exposed, bearing a few fine setae. Last antennal segment slightly swollen, semiglobular, larger than remaining segments. Antennal fossae deep, with very sclerotized, concave margin. Temples truncate, moderately projecting, with lower angle bearing a long dorsal seta that reaches middle of thorax. Both dorsal and ventral regions of head clothed with setae of different sizes and irregular distribution.

Thorax longer than broad, bearing short and medium-size setae scattered on dorsal and ventral regions. Sternal plates apparently fused into a single plate extended along thorax, including ventral setae. Prothorax fused with pterothorax. This fusion apparently indicated by well chitinized longitudinal internal ridge in the middle of thorax. Prothorax subquadrate, smaller than pterothorax, provided with dorsal sublateral flap armed with conspicuous spiniform seta. Pterothorax subquadrate. Anterior thoracic stigmata prominent. Posterior thoracic stigmata reduced.

Legs short and stout. First pair smaller than second and third pair, which are of about same size. All legs clothed with short setae sparsely distributed. Basal tarsal segment of all legs with small pulvilli. Apical tarsal segment of all legs ending in two claws.

Abdomen slightly elongate, ovate, with sinuous lateral margins. Each tergum and sternum, except terminal ones, provided with no more than two irregular rows of short and medium size setae. Segments I–VI with two short and one long latero-marginal seta. The last reaches maximum length on segments IV–VI. Apical abdominal segments with few marginal and inner setae.

Genitalia (Fig. 2) simple, with basal plate elongate, having posterior half distinctly broad, provided with well chitinized walls; with acute sinus at middle of caudal margin. Anterior half gradually tapering to end on long, slender blade of about even width throughout. Parameres apparently absent.

FEMALE (Figs. 3, 4). General morphology and chaetotaxy essentially as in the male. Differences between sexes are found in size and the terminal abdominal

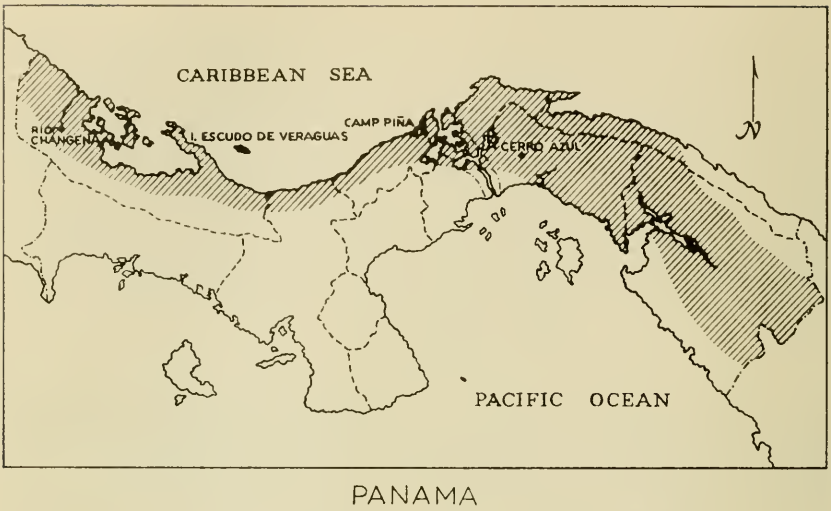


Fig. 5, Map of Panamá showing the known range of *Hoplomys gymnurus* and the localities where *Hoplomyophilus nativus* has been collected.

segments. The female genital area (Fig. 4) presents lateral gonopods provided with setae, preceded by latero-marginal group of setae. Caudal region separating gonopods having one marginal row of six medium-size setae and about two rows of minute setae accompanied by a few short ones. A patch of about ten small spicules is present at the middle of caudal area near its margin.

Types.—Holotype male from Cerro Azul, Province of Panamá, R. P., 21 March 1961; allotype female from Isla Escudo de Veraguas, Province of Bocas del Toro, 21 March 1964; one female paratype from same locality and date as allotype; one female paratype from Camp Piña, Canal Zone, 6 December 1960 and one female paratype from Río Changena, Province of Bocas del Toro, 23 September 1961. All types collected by personnel of the Environmental Health Branch, Office of the Surgeon General, United States Army Caribbean, Fort Amador, Canal Zone.

Lengths.—Male holotype, 1.27 mm; female allotype, 1.46 mm.

Type host.—*Hoplomys gymnurus* (Thomas, 1897).

Holotype and allotype will be deposited in the collections of the U.S. National Museum. One paratype will be deposited in the collections of the British Museum (Natural History). Other paratypes will be deposited in the collections of Dr. Phyllis T. Johnson and the Gorgas Memorial Laboratory, respectively.

Remarks.—It is of some interest to note that the specimens of the present new genus and species of mallophaga obtained on Isla Escudo de Veraguas, were collected from the subspecies *Hoplomys gymnurus*

wetmorei Handley, whereas the continental specimens were taken from *Hoplomys gymnurus goethalsi* Goldman. No morphological differences have been detected among the lice coming from these two different subspecies of host.

It may be assumed that *Hoplomyophilus nativus* is rare since the examination of numerous specimens of the type host from several localities in Panamá over a period of years has indicated that this rodent is more commonly parasitized by mallophaga of the genera *Gyropus* and *Gliricola* of the family Gyropidae.

The terrestrial genus *Hoplomys* belongs to the spiny rat family Echimyidae and is monotypic. In Panamá it has a wide distribution especially along the Caribbean Coast and has been collected in evergreen forest up to an altitude of 2100 feet. Besides Panamá, the genus also is known to exist in the following countries: Costa Rica, Nicaragua, Colombia, Ecuador, Venezuela, Brasil and British Guiana. In figure 5 the range of Hoplomys gymnurus in Panamá is indicated by the cross-hatched area.

I wish to express my sincere appreciation to Dr. Phyllis T. Johnson for allowing me to study and describe this interesting mallophaga. I am also grateful to Dr. K. C. Emerson for advice and criticism given me during the preparation of this paper.

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A KEY TO THE SPECIES OF LYSTRIDEA BAKER WITH DESCRIPTION OF A NEW SPECIES FROM CALIFORNIA

(HOMOPTERA: CICADELLIDAE: ERRHOMENELLINI)

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The species of *Lystridea* Baker were last treated by Oman (1938: 178–180) in his revision of the Nearctic Errhomenellini, a tribe which he (1949: 61) later assigned to the Tettigellinae, now called Cicadellinae. Metcalf (1963: 4) has subsequently transferred the tribe to the Aphrodinae. There is still question as to the correct subfamily placement of the tribe, but the resolution of the matter is beyond the scope of this paper. For a description of the tribe, see Oman (1949: 75).

Lystridea can be separated from all other North American genera in the Errhomenellini by the following combination of characters: crown with numerous, fine, irregularly longitudinal striae; head short and broad, crown not strongly produced anteriorly; head as broad as or broader than pronotum, posterior margin of pronotum not incised. The species of the genus are large (5.5–10 mm.), robust, and known only from our far western States of California, Oregon, and Nevada.

In the key below, it should be noted, only the male genitalia provide characters which allow positive differentiation of species. While size is useful in separating females, there is some intergradation in this character. The female of the new species is unknown. The interested student is referred to Oman (1938: 178–180) for additional data on *uhleri* (Baker) and *nuda* Oman.

KEY TO THE SPECIES OF **Lystridea** BAKER

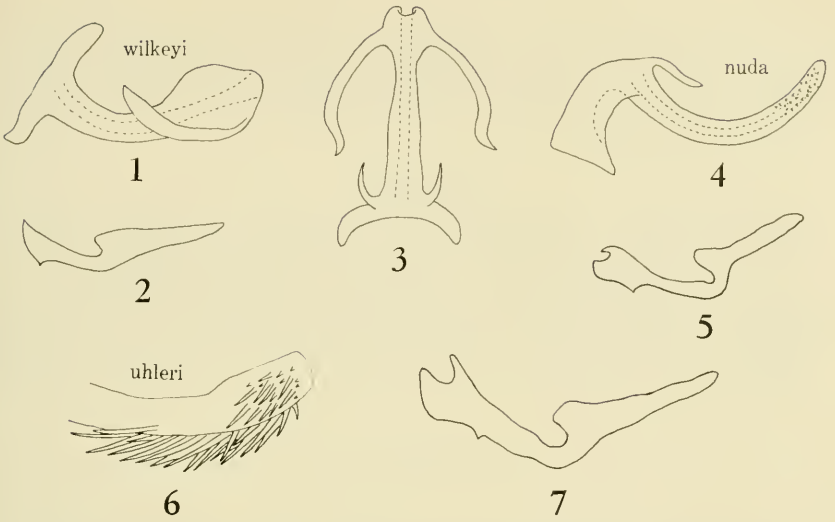
1. Males 2
   Females 4
2. Aedeagus greatly enlarged distally and with long paired processes near apex (figs. 1, 3) ..... **wilkeyi**, n. sp.
   Aedeagus not greatly enlarged distally and without long paired processes near apex 3
3. Aedeagus with many stout setae on apical portion (fig. 6) ..... **uhleri** (Baker)
   Aedeagus with minute teeth on apical portion (fig. 4) ..... **nuda** Oman
4. Length 8–10 mm., width of head 2.75–3.00 mm. ..... **uhleri** (Baker)
   Length 6.75–8.25 mm., width of head 2.50–2.75 mm. ..... **nuda** Oman

Lystridea wilkeyi, n. sp.

(Figs. 1–3)

Length: Male 7.00–7.50 mm.

Coloration: Ground color of venter sordid stramineous to reddish brown, usually marked with black; legs pale brown to reddish brown, variably touched with black and/or spotted with yellow; clypeus and clypellus brownish, usually with



Figs. 1–3, *Lystridea wilkeyi*, n. sp.: 1, aedeagus laterally; 2, style laterally; 3, aedeagus ventrally. Figs. 4, 5, *Lystridea nuda* Oman: 4, aedeagus laterally; 5, style laterally. Figs. 6, 7, *Lystridea uhleri* (Baker): 6, apical portion of aedeagus laterally; 7, style laterally. Note: The aedeagi of *nuda* and *uhleri* are of the same general shape, but the aedeagus of *uhleri* is much larger.

darker irrorations; genae and lora black, heavily marked with yellow as irregular spots on lora and as a crescentic band on each gena; antennal bases and surrounding areas black. Crown, pronotum, and scutellum with ground color yellowish brown; crown and pronotum variably mottled with black, mottling usually strongest on anterior coronal margin either side of apex and on pronotum just behind each eye; scutellum with basal angles and mesal area broadly black; forewings gray, variably mottled with dark brown, most veins marked with alternating tan and dark brown areas.

Male genitalia: Aedeagus in ventral view (fig. 3) with shaft narrowed, a pair of sharp projections basally, and a longer pair of lateral appendages subapically; aedeagus in lateral view (fig. 1) with apical portion greatly enlarged; style (fig. 2) relatively simple.

Female genitalia: Female unknown.

Types: Holotype male, Lebec, California, Alt. 4,000 ft., May 13, 1928, J. O. Martin. Nineteen male paratypes as follows: 1, Bodie, California, 8,475 ft., July 1–7, Wickham; 3, Argus Mts., Inyo County, California, May 22, 1937; 9, Walker Pass, Kern County, California, May 20, 1960, R. P. Allen; 2, 29 miles west of Benton, California, June 24, 1960, R. P. Allen; 2, Junction 395-108, Mono County, California, June 14, 1959, R. P. Allen; 2, Topaz, California, July 4, 1917.

Notes: The species is named for Mr. R. F. Wilkey of the California Department of Agriculture, Bureau of Entomology, Sacramento, Cali-

fornia. He sent me the first specimens of this species for identification. The holotype will be deposited in California Academy of Sciences and paratypes in the collections of the United States National Museum and the Bureau of Entomology of the California Department of Agriculture in Sacramento.

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A NEW NASAL MITE FROM THE ROBIN (TURDUS MIGRATORIUS) (ACARINA, SPELEOGNATHINAE)

GORDON MARSTON CLARK, *U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Institute of Allergy and Infectious Diseases, Rocky Mountain Laboratory, Hamilton, Montana*

In 1963 a series of speleognathid nasal mites was recovered from two robins (*Turdus migratorius*) in the Bitterroot Valley of western Montana. These mites were a new species which is herein described. All measurements are given in millimeters.

Boydaia turdi, new species
(Fig. 1)

ADULT.—Conforms to the characteristics of the genus *Boydaia* as outlined by Fain (1963).

LARVA (Fig. 1A).—Color milky white; shape broadly oval; weakly sclerotized; size, 0.34 in length by 0.3 in width, excluding gnathosoma which is 0.08 wide at base; with three-segmented palpi measuring 0.048 in length; palpal tarsus reduced to a stubby, subapical tibial thumb, bearing two barbelled and one bladelike seta.

Dorsum: Anteriorly with a pair of slightly expanded, circular, finely barbelled sensillae 0.027 in length, preceded by a pair of short presensillar barbelled setae; dorsal setae barbelled, short and expanded, arranged in a 4-4-2-2-2 formula; dorsal cuticle very finely striated.

Venter: With two pairs of short, barbelled sternal setae and two pairs of genital setae.

Legs: Tarsus I specialized and characteristically modified, elongated, measures

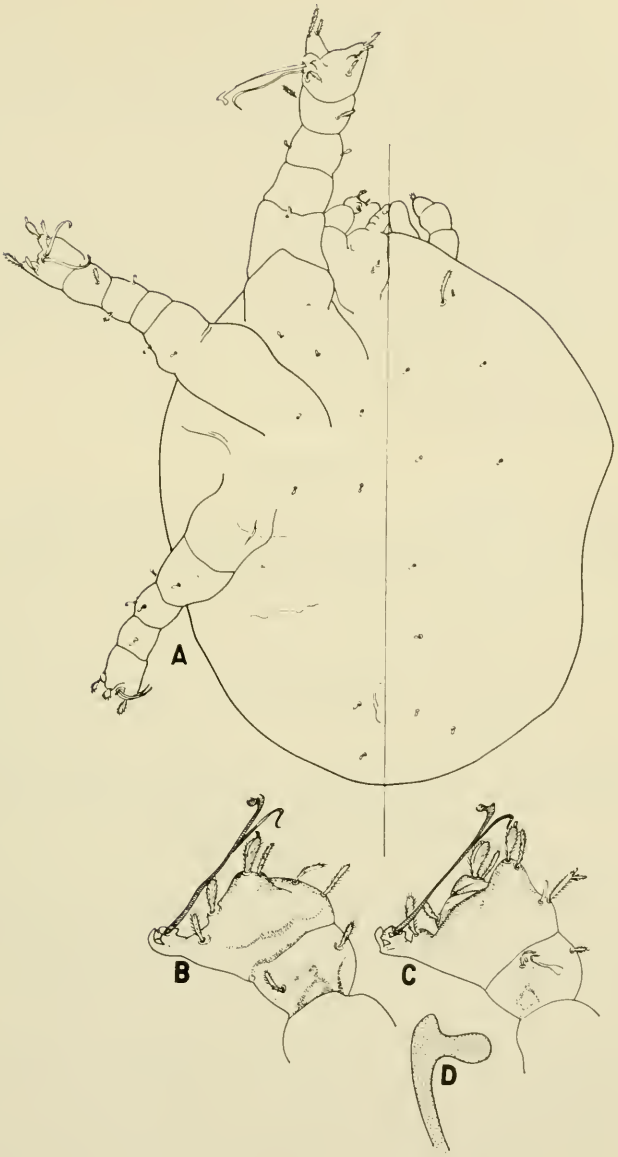

Fig. 1, *Boydaia turdi*, larva: A, ventral and dorsal views; B, tarsus I, dorsal; C, tarsus I, ventral; D, head of claw, tarsus I.

(base of pulvillus to tibia) 0.04 long and 0.05 wide; claws equal in length, 0.065, characteristic in shape, one fine, with a shepherds crook curve apically, the other stouter with a "sea horse head" configuration apically (Fig. 1D); tarsal I setation indicated in Fig. 1B and C; tarsae of other legs relatively unmodified although the claws of tarsus II are elongate, blunt and equal (0.027); claws of tarsus III normal, short, curving, blunt (0.015). Numbers of setae present on leg segments similar to other *Boydaia* larvae.

Diagnosis: *Boydaia turdi* larvae may be distinguished from all other known larvae of the genus *Boydaia*, particularly *B. jordani* van Eyndhoven, 1955, by the configuration of the claws of tarsus I. In *B. turdi* one claw is clubbed, the other has a fine hooked extremity while in *B. jordani* both claws are clubbed.

Holotype: Larva USNM 3247 is deposited in the collection of the United States National Museum, Washington, D.C.

Paratypes are deposited at the Rocky Mountain Laboratory.

Type Host: *Turdus migratorius* Linnaeus.

Type Locality: Lost Horse Canyon, Ravalli Co., Montana.

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DISTINGUISHING AMOEBALERIA DEFESSA (OSTEN SACKEN) FROM A. SACKENI GARRETT

(Diptera: Heleomyzidae)

Gill (1962, Proc. U.S. Nat. Mus. 113: 579) in his revision of this family, stated that these two species could be distinguished only by differences in the male postabdomen. The series of these species in the U.S. National Museum show the following differences; that in the venation of the wing is apparently valid for both sexes.

Amoebaleria defessa (O. S.).—♂, in addition to the postabdominal differences, the hind basitarsus lacks a claw or apicoventral production. In both sexes, the narrowest distance between the 2 branches of vein Rs, near tip of the wing, is distinctly greater than the difference at the same point between the anterior branch (R_{2+3}) and the costa; the angle at the apex of cell R_1 is approximately 25°.

Amoebaleria sackeni Garr.—♂, hind basitarsus with distinct apicoventral production or incipient claw. In both sexes, the anterior branch of Rs is more curved, making the narrowest distance between the branches equal to or less than the distance between the anterior branch and the costa; the angle at apex of cell R_1 is approximately 30°.—George C. Steyskal, *Entomology Research Div., ARS, U.S. Department of Agriculture, Washington, D.C. 20560.*

SOMETHING BETTER THAN POLYPORUS OR PITH FOR DOUBLE MOUNTS

All of the materials commonly used for making double mounts with minuten nadeln frequently give trouble by becoming loose, either on the main pin or the minuten. The silicone rubber that I have been using for microvial stoppers, etc. (Gurney, Kramer, and Steyskal, 1964, Ann. Ent. Soc. Am. 57: 240–242), obtainable from plastics distributors in most large cities as General Electric RTV-11 or Dow Corning RTV-521, has excellent pinning qualities. A very delicate pin may be pushed into it, even with the blunt end foremost, and it will be firmly gripped and not come loose. I cast the material into approximately 3-mm-thick plaques in plastic boxes and cut it into cubes with a knife.—GEORGE C. STEYSKAL, *Entomology Research Division, ARS, U.S. Department of Agriculture, Washington, D.C. 20560.*

SEX RATIOS OF PLATYPUS

(COLEOPTERA: PLATYPODIDAE)

In the use of ultraviolet light traps for determining populations of various forest insects, members of the ambrosia beetle genus *Platypus* are recovered and enumerated. Sex ratios of two species in the genus are of interest.

According to W. M. Blackman (Miss. Agric. Expt. Sta. Tech. Bul. 11:38, 1922), male *Platypus* beetles in galleries greatly outnumber the females. H. G. Hubbard (U.S.D.A. Bur. Ent. Bul. 7:14, 1897) states that "the female is frequently accompanied by several males in the galleries". Both of these workers indicate that males should be encountered with greater frequency than females.

Although the light traps sample only the population of newly emerged adult *Platypus* beetles, moving from trees where they developed to other trees or stumps suitable for attack, there is good reason to believe that both sexes are equally attracted to the ultraviolet light source.

In 1965 and 1966 the following recoveries were found in the trap collections. *Platypus compositus* Say, a species most frequently associated with hardwood trees: 194 males, 135 females. *Platypus flavicornis* Fabricius, a species most frequently associated with coniferous trees: 762 males, 1306 females. The abundance of *P. flavicornis* is attributable to operation of the traps in woodlands predominantly stocked with pine trees. A preponderence of males is not indicated in these studies. A third species of the eastern United States, *P. quadridentatus* Oliver, has not been recovered in the trap collections in Florida.—L. A. HETRICK, *Department of Entomology, University of Florida, Gainesville 32601.*

BOOK REVIEWS

A Revision of the Genus Lobopoda (Coleoptera: Alleculidae) **in North America and the West Indies.** By John M. Campbell. Illinois Biological Monographs 37, 203 pp., 186 figs. University of Illinois Press, Urbana and London. 1966.

The family Alleculidae has been neglected until just recently, and the genus *Lobopoda*, one of the most difficult, was in bad need of work. This revision by Campbell helps to make sense of *Lobopoda* and points to more good work in the family. *Lobopoda* now contains 195 described species, all from the New World. Of those, 87 are from the area covered in this revision. Campbell has arranged the 87 species (30 new) in 5 subgenera (3 new) and 33 species groups. Descriptions of all taxa, distributions, and illustrations of male genitalia are given. The males are keyed to species; females are keyed to subgenus but only in one subgenus are they keyed to species. Phylogenetic trees give some idea of relationships between species, and the position of the genus in the family is discussed. Campbell is to be congratulated on his first major work.—T. J. Spilman, *Entomology Research Division, ARS, U.S. Department of Agriculture, Washington, D.C. 20560.*

A Bibliography of the Psocoptera (Insecta). Australian Zoologist XIII (2): 137–209, 1965. **A Catalogue of the Psocoptera of the World.** Ibid XIV (1): 1–145, 1967. By C. N. Smithers. Price: Of latter, $2.00; of former, not known.

These publications are regarded as of such major importance as to merit general notice; for specialists of the Psocoptera (Corrodentia) they are invaluable. The bibliography, estimated to consist of more than 1,200 titles, was compiled with the active cooperation of 22 specialists and others. The catalogue includes 1,605 species regarded as valid, in 197 genera and 31 families. All valid species and synonyms, including those preserved in amber but not other fossils, are listed, with their distribution. However, precise type localities and most references subsequent to original descriptions are not shown. Mr. Smithers, Curator of Insects in the Australian Museum, Sydney, who has studied psocid systematics for some 12 years and is still a young man, in these two publications has earned warm thanks for retrieving the scattered literature of a much neglected group of insects. —Ashley B. Gurney, *Entomology Research Division, ARS, U.S. Department of Agriculture, Washington, D.C. 20560.*

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>
> ———— and L. M. Walkley. 1951. *in* Muesebeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. Dept. Agr., Agr. Monogr. 2: 90–184.

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THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

ORGANIZED MARCH 12, 1884

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ON THE OCCURRENCE OF TWO SPECIES OF PALAEACARUS IN THE EASTERN UNITED STATES[1]

(ACARI: ACARIFORMES)

DONALD E. JOHNSTON, *Institute of Acarology, The Ohio State University, Columbus, Ohio 43210*[2]

The first palaeacaroid mites to be made known from North America were *Palaeacarus appalachicus* (Palaeacaridae) and *Acaronychus tragardhi longipilus* (Acaronychidae), both described as new from North Carolina by Jacot (1938, J. Elisha Mitchell Sci. Soc. 54:127). Subsequently, mites determined as *Acaronychus* sp. from Virginia (Sengbusch, 1957, Virginia J. Sci. 8(2):128) and *Acaronychus tragardhi* from Colorado (Woolley, 1960, Ann. Entomol. Soc. Amer. 53(2):251) have been recorded. In addition, there are in the Collections of the Institute specimens of *Acaronychus longipilus* Jacot from Virginia (G. O. Evans and D. E. Johnston colls.) and undescribed species of *Ctenacarus* Grandjean (Ctenacaridae) from Georgia (P. E. Hunter coll.) and Arizona (D. M. Tuttle coll.).

Palaeacarus appalachicus Jacot apparently has not been recorded again since the original description of the species. Zakhvatkin (1945, Dokl. Akad. Nauk SSSR XLVII(9):673) referred the species to his new genus *Tragardhacarus* (type species: *T. lapshovi* Zakhvatkin, 1945). In view of the great number of characters shared by *P. appalachicus* and *P. hystricinus* Tragardh, 1932 (the type species of *Palaeacarus*) this transfer cannot be maintained. Evans (1952, Ann. & Mag. Nat. Hist., ser. 12, v:660), on the basis of an examination of two Jacot cotypes, synonymized *P. appalachicus* with the European *P. hystricinus*. Grandjean (1954, Mem. Mus. Nat. Hist. Natur., N. S., Zool., VII(3):179), in his detailed study of the Palaeacaroidea, demonstrated differences between European specimens of *P. hystricinus* and a cotype (obtained from Evans) of *P. appalachicus*. On the basis of his studies Grandjean concluded that *appalachicus*, along with *P. hystricinus vasterbottensis* Grandjean, 1954 (described from northern Sweden), is a geographic race of *P. hystricinus*. The present discovery of the sympatric occurrence of *P. appalachicus* and *P. hystricinus* in the

[1] Work supported by National Science Foundation Grant No. G-19325.

[2] Immediate publication secured by full payment of page charges—Editor.

eastern U. S. necessitates a revision of Grandjean's conclusion and the two forms are here regarded as distinct species.

The material recorded here was collected from a mixed deciduous forest in the Patuxent Research Refuge near Laurel, Maryland. The litter in the collecting area is predominantly made up of oak (*Quercus*) leaves. The specimens were taken by H. W. Hurlbutt in the course of an ecological study of mites of the genus *Veigaia* (Mesostigmata). In the samples examined (unfortunately only a few of the samples collected were available to the author) *P. hystricinus* was by far the least numerous; only three specimens have been found. These were collected from the H layer on 2 August 1960. *Palaeacarus appalachicus* was much more numerous and was found in the L, F, and H layers. Collection records of this species for the following months of 1960 are available: March, June, July, August, November, and December.

The mites reported above agreed precisely with Grandjean's (*op. cit.*) description and figures. They may be distinguished as follows: *P. hystricinus* has the famulus large, distally curved (sickle-shaped), and situated on a prominent tubercle; the notogastral setae h_1 and ps_1 are bulbous. In *P. appalachicus* the famulus is (relatively) short, straight, and is not situated on a tubercle; the notogastral setae h_1 and ps_1 are spine-like.

While the sample containing the three specimens of *P. hystricinus* contained no *P. appalachicus* there is nothing in the available data to suggest any gross difference in their niche requirements. Specimens of both species were found to have their midguts filled with fungal hyphae.

All specimens recorded by the author are in the Collection of the Institute of Acarology. Grateful acknowledgment is made to Dr. Hurlbutt for the opportunity to examine his collections.

CHROMOSOMES OF THE APHID GENUS DACTYNOTUS[1] (HOMOPTERA)

A. THOMAS OLIVE, *Department of Biology, Wake Forest University, Winston-Salem, N. C. 27109*[2]

This is a report on the chromosome number of 17 species of the genus *Dactynotus* Rafinesque from the eastern United States. Several recent papers have reported aphid chromosome numbers, but only one has included species of *Dactynotus*. Rou-Yun Sun and A. G. Robinson (1966) listed *Dactynotus cirsii* (Linnaeus) with 2n = 10 and *Dactynotus taraxaci* (Kaltenbach) with 2n = 12. Makino (1951) lists several aphids which could possibly belong to *Dactynotus*, but the identifications are questionable.

This study was begun with the hopes that differences in karyotypes would aid in separating some of the taxonomic complexes of the genus, but the results were unfavorable for this purpose.

METHODS AND MATERIAL

Aphids, still feeding on the host, were brought in from the field and were squashed as soon as possible in order to obtain the most cells in metaphase. The best squashes were made from alate or apterous adults or from last-instar nymphs. The method of preparation was similar to the "quick examination method" described by Sun and Robinson (1966). A live aphid was placed on a clean slide under a dissection microscope, and the tip of the abdomen was removed by a micro-scalpel. The abdominal contents were pressed out, and all material except embryos not yet showing eye spots was removed from the slide. A drop of aceto-orcein was placed on the embryos, and a cover glass was applied. The cells were spread by gently tapping the cover glass with the eraser of a pencil, and the preparation was heated over an alcohol lamp. The slide was then placed between the pages of a bibulous paper book, and a great amount of pressure was applied by the thumb. This is in contrast with the "light pressure" called for by MacDonald and Harper (1965) and Sun and Robinson (1966). The heavy pressure was necessary to assure a flatter spread of chromosomes. The cover glass was then ringed with Zut slide ringing compound. After drying for a few minutes the preparation was ready for examination.

Examination was through a Leitz Ortholux microscope with a 90× Apochromatic oil immersion objective, or a 100× phase contrast oil immersion objective. Photomicrographs were taken through a Leitz

[1] This study was supported by N. S. F. grants GB-3526 and GB-6172.
[2] Immediate publication secured by full payment of page charges—Editor.

Table 1.—Diploid chromosome numbers of 17 species of *Dactynotus*.

Name	Chromosome number (2n)
Dactynotus ambrosiae (Thomas)	12
Dactynotus anomalae (Hottes and Frison)	12
Dactynotus bradburyi Olive	12
Dactynotus chrysopsidicola Olive	12
Dactynotus gravicornis (Patch)	12
Dactynotus helianthicola Olive	12
Dactynotus nigrotuberculatus Olive	12
Dactynotus pseudambrosiae Olive	12
Dactynotus reynoldensis Olive	12
Dactynotus rudbeckiae (Fitch)	12
Dactynotus ruralis (Hottes and Frison)	10
Dactynotus russellae Hille Ris Lambers	12
Dactynotus sonchellus (Monell)	12
Dactynotus sonchi (Linnaeus)	12
Dactynotus tissoti (Boudreaux)	12
Dactynotus tuataiae Olive	12
Dactynotus verbesinae (Boudreaux)	10

4×5 Aristophot camera attached to the microscope. When phase contrast objectives were necessary to observe lightly-stained chromosomes, Polaroid 4×5 film was used (Type 57, ASA 3000).

All species in this study were identified by the author.

Results and Discussion

Of the 17 species of *Dactynotus* examined, 15 had 12 chromosomes and two had 10 chromosomes. Table 1 lists the species and the diploid chromosome number of each. The karyotypes of the species with 12 chromosomes appear to be identical, and the karyotypes of the two species with 10 chromosomes appear to be identical. Preliminary statistical analysis showed as much variation in chromosome lengths in cells of one individual aphid as there was from one species to another. Aphids with 12 chromosomes have two short pairs, three medium-length pairs, and one long pair. The six medium-length chromosomes are so near the same size that they cannot be paired or identified one from the other. There is a small gradation from the

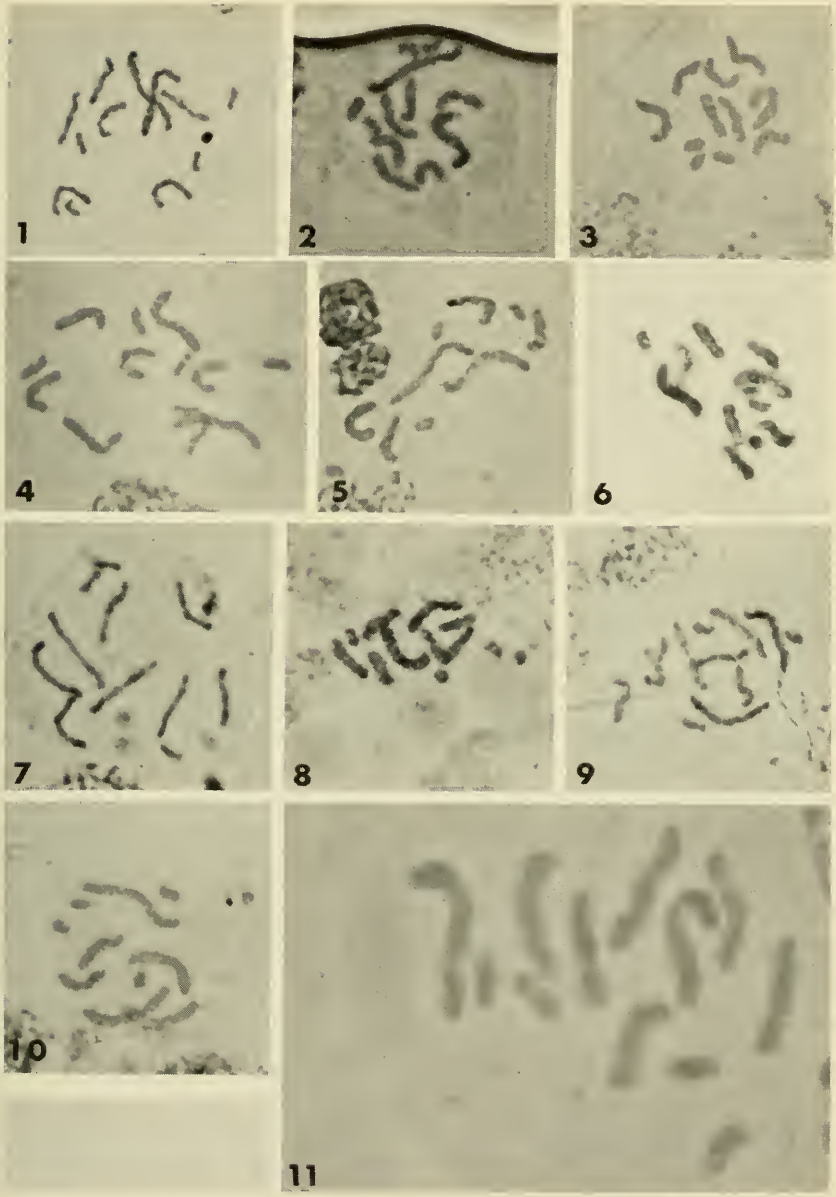

Fig. 1, *Dactynotus gravicornis*, 2n = 12. Fig. 2, *D. helianthicola*, 2n = 12. Fig. 3, *D. nigrotuberculatus*, 2n = 12. Fig. 4, *D. pseudambrosiae*, 2n = 12. Fig. 5, *D. ruralis*, 2n = 10. Fig. 6, *D. russellae*, 2n = 12. Fig. 7, *D. sonchellus*, 2n = 12. Fig. 8, *D. sonchi*, 2n = 12. Fig. 9, *D. tuataiae*, 2n = 12. Fig. 10, *D. verbesinae*, 2n = 10. Fig. 11, *D. nigrotuberculatus*, 2n = 12. Figs. 1–10, X 1710. Fig. 11, X 2813.

Fig. 12: a, Idiogram of *Dactynotus nigrotuberculatus,* n = 6; b, Idiogram of *D. ruralis,* n = 5.

longest of the six to the shortest. (See idiogram, Fig. 12 a.) Of the two short pairs, two chromosomes are always slightly longer than the other two. (See Figs. 1, 2, 3, 4, 6, 7, 8, 9, and 11.)

In the two species with 10 chromosomes (*D. ruralis* and *D. verbesinae*), the karyotype seems identical to that of the 12-chromosome species, except that one of the three pairs of medium-length chromosomes is absent. (Figs. 5, 10, 12 b.) It is noteworthy that the two species are closely related. Both are similar morphologically, both belong to the subgenus *Uromelan,* and both occur on the same genus of host plant, *Verbesina. D. ruralis* occurs in the mid- and northeastern states, while *D. verbesinae* is known to occur only in the Louisiana area. Both species are typical of the genus *Dactynotus,* having no outstanding characteristics that would set them apart from the rest of the genus.

At one point in the investigation, it was thought that possibly two of the chromosomes are joined in the haploid karyotype of five chromosomes. This now seems unlikely because, first, the shape of the chromosomes of the two karyotypes is similar, and second, there is more total chromatin material in the karyotype of 12 than there is in the karyotype of 10 chromosomes. At this point, the author has no suggestions as to the relationship between the two karyotypes.

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SOME PSOCOPTERA FROM PLUMAGE OF BIRDS

EDWARD L. MOCKFORD, *Department of Biological Sciences, Illinois State University, Normal, Illinois 61761*[1]

Although psocids have been recorded on a number of instances from the fur of wild and domestic mammals (literature reviewed by Pearman, 1960), and from the nests of birds (Hicks, 1959, Rapp, 1961, Wlodarczyk, 1963), there are apparently no records of these insects from the plumage of living birds.

The following records are of considerable interest from a biogeographic point of view. At least for smaller psocids, it appears that phoresy on birds offers a means of dispersal over long distances and lacks the formidable difficulties presented by wafting in the open air. The plumage of a bird offers a constant warm temperature, probably high relative humidity, and perhaps a food supply in the form of skin scurf and other debris.

The migratory habits of many birds, including the emberizine finches of the present records, assure that any insect riding the plumage of one of these birds with some regularity will have access for colonization to the terrestrial areas along the bird's migration route. Thus, if the insect fails to become established in a particular area once, it has many more chances. The fairly common occurrence of wandering or being blown out of its usual migratory course may result in the bird's finding its way across a vast water area to an island or a continent new to it. Whereas the bird may have little chance of establishing its species in the new area, the insects riding its plumage, especially the parthenogenetic ones, may have a much greater chance. In this connection, it is interesting to note that three of the four psocid species of the present records have very wide distributions involving more than one continent even when we ignore the obvious records of transport in human commerce.

Whereas psocids are doubtless most likely to crawl onto birds at the nest, three of the present records were made outside of the nesting seasons of the birds involved, and strongly suggest that psocids may crawl onto birds from a feeding area or a roosting area.

The remarks of Pearman (1960) concerning the bearing of mammal- and mammal-lair inhabiting psocids on the evolution of the Mallophaga apply equally to birds.

Information on ranges of the birds involved is taken from Delacour (1947) and Vaurie (1959, 1965).

The specimens were received from the Entomology Research Division of the United States Department of Agriculture, whence they were sent by Dr. H. Elliott McClure of the Migratory Animal Path-

[1] Immediate publication secured by full payment of page charges—Editor.

ological Survey, Bangkok, Thailand. The bird identifications were made by Dr. McClure. A letter accompanying the specimens states that a rapidly killing insecticidal dust was used which allowed collections to be made from the live birds.

The specimens have been deposited in the collection of Illinois State University.

Family Atropidae

Lepinotus reticulatus Enderlein

Chin Chup Myun, Kyunggi Prov., Korea; August 21, 1965, 1 female on adult *Emberiza fucata* Pallas (gray-hooded bunting). Same locality, September 12, 1965, 1 female on adult *Emberiza rutila* Pallas (chestnut bunting). Same locality, September 22, 1965, 1 female on subadult *E. rutila.*

This psocid occurs over the drier parts of the United States and Mexico, is well represented in Chile, is recorded from France, Germany, Egypt, Algeria, Mozambique, Canary Islands, Southern Australia, and Tasmania. The present records are the first for Asia. Only the records from France are clearly from domestic situations. Males are known only from Germany, and the species is presumably parthenogenetic throughout much of its range.

This psocid inhabits principally ground litter and grass clumps on well-drained soil in arid and semi-arid regions and on sand dunes in more humid regions. It has been found in the nests of several species of birds (Hicks, 1959). The three instances of its occurrence on buntings of the genus *Emberiza* suggest that this relationship is regular.

Emberiza rutila breeds in eastern Siberia, migrates through eastern China and Korea, and winters in southeastern China, the Indo-Chinese countries, Assam, and northern Bengal. It straggles east to Japan and Formosa and west to Holland and France. *Emberiza fucata* breeds somewhat further south than *E. rutila* and in Japan. Its northern populations are migratory and winter in the Ryu Kyus, southeastern China, the Indo-Chinese countries, and eastern India.

Family Liposcelidae (=Troctidae)

Embidopsocus trichurensis Menon.

Balian, Luzon, P.I.; June 5, 1964, 1 macropterous female from male *Chalcophaps indica* (L.) (green-winged ground dove). The identification of the psocid was made by comparison with two topotypic specimens, one determined by Menon.

E. trichurensis was known previously only from the type locality, Trichur, Kerala, India. The present record suggests that the species is widespread in southeastern Asia. It occurs on dried leaves on the ground or hanging from plants.

Chalcophaps indica occurs from India east to the Philippines and south to Australia. It lives under cover in bush and forest. I have found no information about its movements.

Liposcelis entomophilus Enderlein

Limot, Davao Prov., Mindanao, P.I. June 9, 1965, 1 female on fledgling *Dicrurus hottentottus* (L.) (spangled drongo).

L. entomophilus is widespread in tropical Africa where it apparently occurs as part of the native fauna. Records from Europe, Chile, United States, and Japan are from domestic situations. The present record suggests that it may also be native in the Philippines. It was reported from the nest of a weaver finch, *Ploceus cucullatus* (Müller), in Angola (Badonnel, 1955).

Dicrurus hottentottus occurs from India east to the Philippines, south through Australia, and in Borneo and the Sunda Islands. I have found no information about its movements. Since it is a tropical polytypic species, there is probably little movement from one region to another.

Family Peripsocidae

Ectopsocopsis cryptomeriae (Enderlein)

Chin Chup Myun, Korea, July 13, 1964, 1 male on adult male *Alcedo atthis bengalensis* Gmelin (river kingfisher).

E. crytomeriae occurs as part of the native fauna in Japan, Taiwan, Hong Kong, eastern United States, northern Mexico, and Puerto Rico. It enters houses occasionally and is carried at times in human commerce. It is generally found on dried leaves of plants, hanging from the plant or on the ground.

Alcedo atthis bengalensis breeds in eastern Siberia south through central China and occasionally further south on the continent, also in Japan, the Ryu Kyus, and Formosa. It winters in the Malay Peninsula, the Indo-Chinese countries, the Greater Sundas, Philippines, and some surrounding islands.

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THE FIRST RECORD OF THE PADUNIELLINI IN THE NEW WORLD
(TRICHOPTERA: PSYCHOMYIIDAE)

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Intermingled among material recently collected in Arkansas by Dr. R. W. Hodges was a most unusual new species of Trichoptera. When the genitalia of this specimen were cleared, it was immediately obvious that this represented a genus and species not previously known from the New World. It was finally determined that the species agreed in all structural characteristics with the genus *Paduniella.*

Paduniella was erected by Ulmer in 1913 for his species *semarangensis* from Java. Since then, some dozen and a half species from Africa, India, Ceylon, Philippines, Indonesia, and the south Usuri region of Russia have been described. *P. nearctica* is the first species to be discovered in the New World. Although several genera have been proposed for these species, they all seem congeneric.

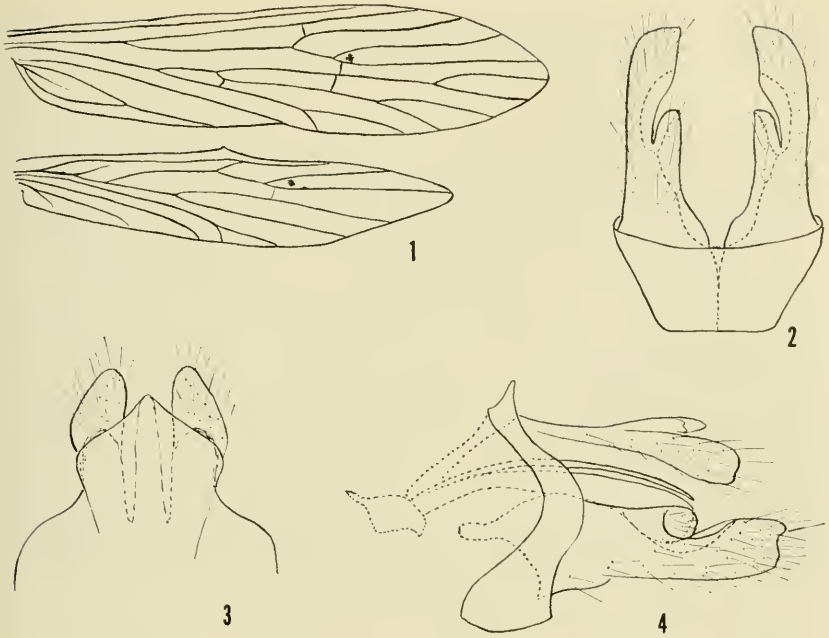
Because Fischer (1962) recognizes the Polycentropodidae as a family distinct from the Psychomyiidae, he treats these species as comprising a subfamily, the Paduniellinae. However, if one considers, as other workers and I do, that the Polycentropodinae and Psychomyiinae are coordinate subfamilies of the Psychomyiidae, then the taxon is reduced to the tribe Paduniellini in the Psychomyiinae.

Within the Psychomyiidae, this is the only taxon with 6-segmented maxillary and 4-segmented labial palpi. All the other groups have one less segment in each palpus. Except for the lack of the crossvein between R_{2+3} and R_4 in the forewing of *Paduniella,* the wing venation and shape are the same as some other psychomyiids, such as the common *Psychomyia flavida* Hagen. The immature stages are totally unknown.

Paduniella nearctica, n. sp.

This species appears to be close to the Ceylonese *P. sanghamittra* Schmid, especially in the shape of the clasper, but differs in possessing only 1 spine above the aedeagus.

Adult. Length of forewing, 4.5 mm. Color uniformly pale yellowish-brown, antennae annulate with brown. Male genitalia: Ninth segment narrow, much modified, sternum extending dorsad as a narrow process, tergum apparently a narrow, darkened structure between membranous eighth segment and cercus. Cercus broadly united to ninth tergum, extending posteriad as a broad rounded lobe. Tenth tergum a mostly membranous, conical lobe between ninth tergites. Clasper elongate, quadrate in lateral aspect with a dorsomesal, thumb-like lobe; a concave pocket on inner surface of lobe and adjacent part of clasper. Aedeagus with paired rods articulating between base and dorsal angles of ninth sternum; a small basal section set off from a long, compressed tube, which is widened apically and overlain with a single long, slender spine.



Figs. 1–4., *Paduniella nearctica,* n. sp.: 1, venation, fore and hindwings; 2, claspers, ventral; 3, tenth tergum and cerci, dorsal; 4, male genitalia, lateral.

Holotype, male: Arkansas, Washington Co., Devil's Den State Park, 30 May 1966, R. W. Hodges. USNM type 69209. Paratypes: Arkansas, Washington Co., Cove Creek, light trap, 19 May 1962, O. & M. Hite, 3 ♂, same but, 20 May 1962, 2 ♂.

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BIONOMICS OF CERCERIS SIMPLEX GRAPHICA AT LAKE TEXOMA (HYMENOPTERA: SPHECIDAE: PHILANTHINAE)

C. S. LIN, *Huston-Tillotson College, Austin, Texas 78702*

The cercerine wasps are world-wide in distribution with about one hundred species inhabiting North America. The biology and nesting habits for over a score of species (see list) have been observed in this country.

Cerceris simplex graphica F. Smith is one of the largest wasps of the genus, the average body length of the females being 20 mm. According to Scullen (1965b), this subspecies is recorded from Ecuador and Peru north through Central America and Mexico with one record from Portal, Arizona. The first wasp and prey were collected by this writer on June 28, 1965 on a small sand dune at Lake Texoma, Oklahoma. Subsequent field observations were made in July, 1965–67. The wasp hunts a single species of tenebrionid beetles as larval food.

There is very little information concerning the tenebrionid-hunting *Cerceris* on record. Poulton (1917) discussed predaceous fossors from Sao Paulo District of Southeast Brazil with two examples of *Cerceris simplex* F. Smith which were captured in burrows "deep in the earth." One tenebrionid beetle, *Epitrague* sp. was found in one of the burrows. Scullen (1965a) mentions two prey records for *Cerceris macrosticta* Viereck and Cockerell; one a tenebrionid beetle collected by C. H. Hicks in Boulder, Colorado, and another beetle, *Metopoloba pruinosa* (Horn) collected by F. G. Werner and G. D. Butler in Pima Co., Arizona. Wasbauer (1957) has observed a female *Cerceris athene* Banks transporting in flight a tenebrionid beetle, *Eurymetopon rufipes* Eschscholtz, to her nest at Mecca, California.

ECOLOGY OF THE NESTING SITE

Thirty nests of this wasp were found on a small sand dune known locally as Paw Paw Point adjacent to the Red River arm on north shore of Lake Texoma, Oklahoma. This is a typical small wind-blown sand dune about an acre in area. Its upper dome-shaped layer is covered with loose white sand while the lower portion is red quartz sandy clay which is crust-like in formation (fig. 1). An abandoned wheat field adjoins the dune to the north. Tamarack and black willow shrubs on the lake shore and various weeds and tall grasses form the main vegetation around the northwest of the sand. Several species of sand wasps, mutillid wasps, and spider wasps were seen hunting and nesting on the dune. The nesting site of *Cerceris simplex graphica* F. Smith was concentrated on the crusty slope facing south to the lake. Each nest was marked by a garden stake (fig. 1).

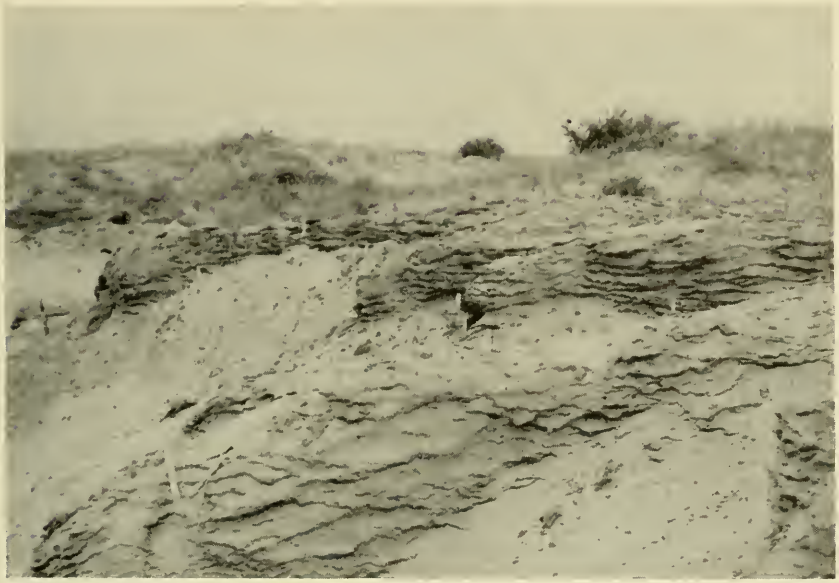

Fig. 1. Nesting site of *Cerceris simplex graphica.*

Nest Construction

A total of 15 nests were excavated and examined by this writer. One of the most striking features of these nests is that they are the deepest among the digger wasps. The general architectural plan of these nests is as follows: a long vertical shaft connecting to a slightly curved tunnel with a temporary chamber, then straight downward to the brood chamber (figs. 2, 3). The shaft is 8 mm in diameter and the entranceway is slightly larger and is surrounded by some sand heap. So a typical nest consists of three levels, each about 1 meter in length. There was no digging activity outside the dune. The female wasps must be cryptozoic diggers for they spend long hours and tremendous effort in order to excavate and construct a nest of such a magnitude.

Hunting and Provisioning Activities

There were over thirty nests on the sand dune by mid July, but only four to five female wasps were seen engaged in hunting and provisioning activities on any given day. They made their appearance at the entranceway at about 8:30 in the morning. Each wasp paused a few seconds before taking off. There orientation flights were made first by low clock-wise circles near the entrance, then several higher counter clock-wise circles over the burrow and finally, a very swift

Fig. 2. Three excavated nests of *Cerceris simplex graphica.*

turn toward the north, presumably to the abandoned wheat field some 1000 meters beyond the dune. The wasp spent 15–40 minutes in a hunting trip and the prey was brought back directly into the nest, since the entrance is always open. The wasp grasps the prey's antennae with her mandibles. The legs of the victim still cling firmly to the wasp's body during the flight. No more than five prey were brought in by each of these wasps during the entire morning hours of activity. The prey consisted of a single species of Tenebrionidae, *Eleodes opaca* (Say). The larval stage of this beetle is the well-known and destructive wheat pest, the plains false wireworm.

Of all these nests carefully excavated and examined, not a single fully provisioned cell was recovered; only one or two beetles were found in the temporary chamber (fig. 3-A). These beetles were slightly paralyzed but capable of walking around, and lived for many hours. It is probable that the wasp put the beetles inside the temporary chamber to let them completely defecate before transporting them into the brood chamber (fig. 3-B).

List of Prey-Selection of North American Cercerine Wasps

1. Curculionid-hunting *Cerceris*: *C. architis* Mickel (Abbot 1928) = *C. halone* Banks (Byers 1962), *C. atramontensis* Banks (Krombein 1956), *C. b. bicornuta* Guerin (Strandtmann 1945), *C. bicornuta fidelis* Viereck and Cockerell (Krombein 1960), *C. blakei* Cresson (Krombein 1963), *C. clypeata* Dahlbom (Peckham

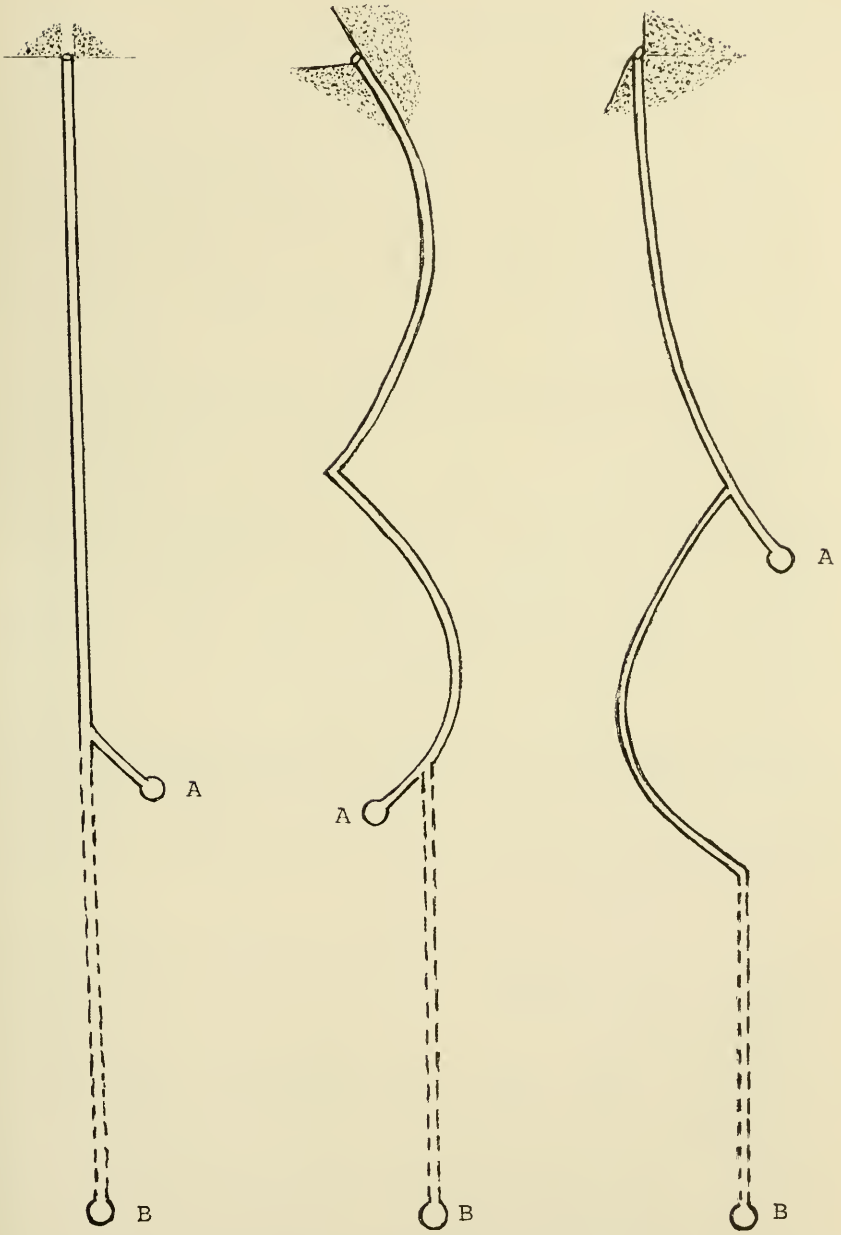

Fig. 3. Profile of nests of *Cerceris simplex graphica*: A, temporary chamber; B, brood chamber. Broken lines indicate the tunnel leading to the brood chamber.

and Peckham 1898), *C. deserta* Say (Peckham and Peckman 1898), *C. frontata* Say (Krombein 1960), *C. nigrescens* F. Smith (Krombein 1936, 1938), *C. raui* Rohwer (Rau 1928), *C. rufinoda* Cresson (Strandtmann 1945).

2. Chrysomelid-hunting *Cerceris*: *C. compacta* Cresson (Scullen 1965a), *C. finitima* Cresson (Strandtmann 1945), *C. f. flavofasciata* H. S. Smith (Krombein 1959), *C. flavofasciata floridensis* Banks (Krombein 1964), *C. r. robertsonii* Fox (Krombein 1953), *C. robertsonii emmiltosus* Scullen (Krombein 1964).

3. Buprestid-hunting *Cerceris*: *C. californica* Cresson (Linsley and MacSwain 1956), *C. fumipennis* Say (Grossbeck 1912, Cartwright 1931, Krombein 1958).

4. Bruchid-hunting *Cerceris*: *C. convergens* Viereck and Cockerell (Scullen 1965a), *C. truncata* Cameron (Werner 1960).

5. Tenebrionid-hunting *Cerceris: C. femurrubrum athene* Banks (Wasbauer, 1957), *C. macrosticta* Viereck and Cockerell (Scullen 1965a).

Summary

The nesting behavior and prey selection of *Cerceris simplex graphica* F. Smith were observed for the first time at Lake Texoma, Oklahoma. Thirty nests were found on the crusty slope of a small wind-blown sand dune adjacent to the north shore of the lake. Female wasps spend very lengthy periods in digging deep vertical burrows, usually 2–3 meters long. Hunting activity occurs in morning hours only. Prey consisted of a single species of tenebrionid, *Eleodes opaca* (Say). Over three quarters of the North American cercerine wasps remain unstudied. The prey preference of the beetle families may have subgeneric significance in systematics.

Acknowledgments

This study was conducted at the University of Oklahoma Biological Station at Lake Texoma, Oklahoma and was supported by the NSF grant GY 403. The author is indebted to Dr. Carl D. Riggs, Director of the Biological Station, for the research grant and facilities at the Station which made this study possible. Special appreciation is expressed to Dr. K. V. Krombein and Dr. H. A. Scullen for their kind suggestions.

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ON THE GENUS RHIPIBRUCHUS BRIDWELL, WITH DESCRIPTIONS OF A NEW SPECIES AND A CLOSELY RELATED NEW GENUS

(COLEOPTERA: BRUCHIDAE: BRUCHINAE)

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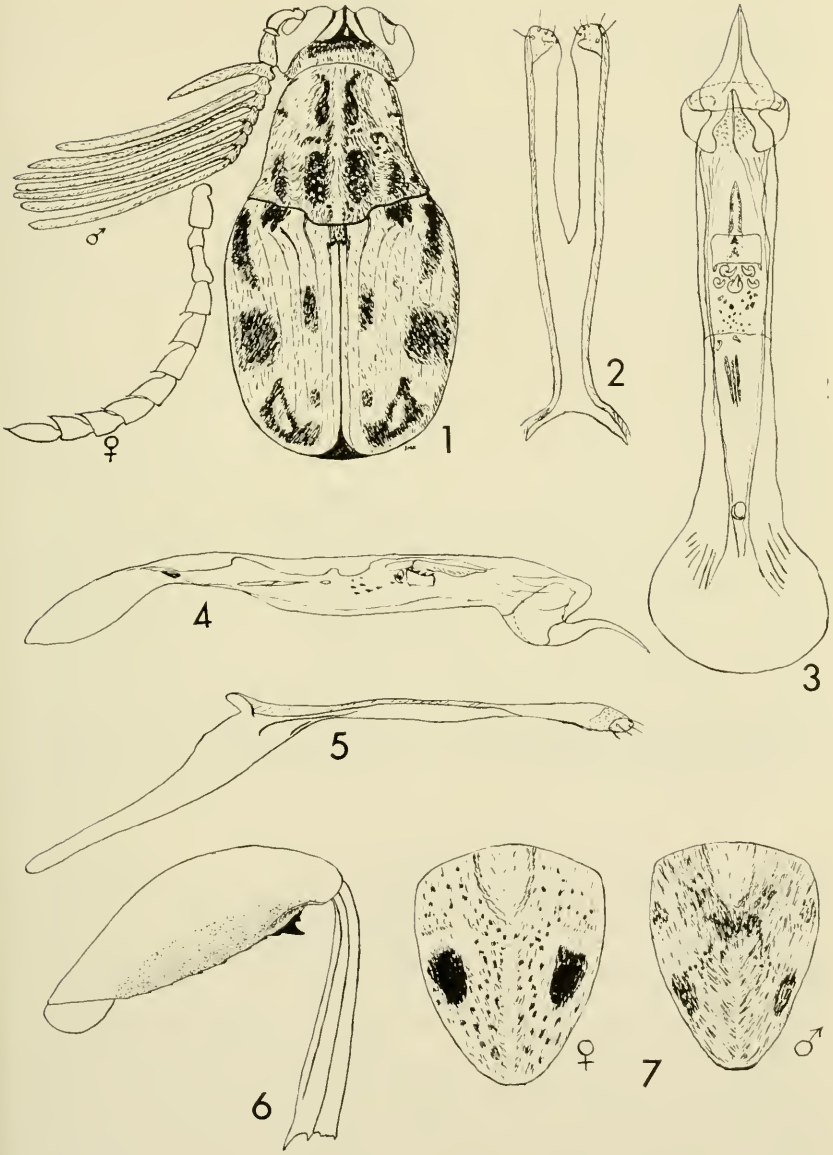
The disordered state of classification in the family Bruchidae at the present time demands that each existing genus be defined more exactly using the type-species as the nucleus. Older descriptions may not include characteristics which are now considered important as a result of more extensive studies of the entire family, and characteristics found in male and female genitalia have very seldom been included heretofore. For any genus to be properly placed in relation to other genera in the family, more general and specific characteristics need to be recorded and compared. It is hoped that the present analysis will help place the genus *Rhipibruchus* Bridwell properly in future studies at the generic level in Bruchidae.

The purpose of this paper is to further describe *Rhipibruchus* and its type-species and a new species, and to describe a new genus and species closely related to *Rhipibruchus*. All three species have been intercepted in Plant Quarantine inspections.

Genus **Rhipibruchus** Bridwell

Rhipibruchus Bridwell, 1932, Proc. Ent. Soc. Wash. 34(6): 105. New name for *Megalorhipis* Philippi, 1859, Anal. Univ. Chile 16: 668 (not Lacordaire, 1857).

Body ovate, rather broad, about 1.5 times as long as wide. *Head* short, broad, width across eyes equalling height of head, strongly constricted behind eyes; eyes prominent, very narrowly separated in the male, farther apart in female (figs. 9, 10); front with shining, prominent vertical keel expanded at dorsal end; male antenna very strongly flabellate in apical segments, female antenna moderately serrate (fig. 1). *Prothorax* campaniform, disk convex with narrow median channel separating paired apical and basal tumescences which are strongly punctate, paired lateral tumescences present near basal margin; median basal lobe rounded, lateral margins slightly convex, lateral carina obsolete. Scutellum slightly elongated, apex angulate-emarginate. *Elytra* together subquadrate, each elytron rounded apically, disk flat, striae well-marked in lightly colored pubescent areas, first (sutural) stria extending from apex of scutellum to near apex of suture, second stria deflected laterally in basal fifth then hooked slightly inward at extreme base, third and fourth striae originating in prominent bidentate subbasal tumescence, third, fourth and fifth striae deflected laterally in basal one-fourth, ninth and tenth striae merging at apical one-fourth; color pattern composed of spots and fasciae (figs. 1, 8). Mesosternum not swollen; mesepimeron narrowed ventrally due to encroachment by mesepisternum. Front and middle legs slender, front coxae contiguous apically for half their length, middle coxae narrowly separated; hind femur moderately swollen, finely serrate in basal two-thirds on ventral margin, tridentate near apex on ventral margin of inner face (fig. 6), hind tibia straight,



Figures 1–7. *Rhipibruchus picturatus* (Fahraeus). 1—Dorsal habitus. 2—Male genitalia, lateral lobes, dorsal aspect. 3—Male genitalia, median lobe, ventral aspect. 4—Male genitalia, median lobe, lateral aspect. 5—Male genitalia, lateral lobes and tegmen, lateral aspect. 6—Hind femur and tibia. 7—Pygidia, caudal aspect.

apical margin dentate, mucro short, acute lateral carinae well-marked; basitarsus longer than remaining four segments. *Pygidium* as in Fig. 7, female with prominent paired dark markings, apex not bent under, sternites of normal length; male with lighter lateral areas, apex bent under, sternites strongly telescoped and shortened medially.

Type species.—*Megalorhipis leiboldi* Philippi (monobasic).

Range.—Argentina, Chile, Colombia, Uruguay.

Rhipibruchus Bridwell was proposed as a new name for *Megalorhipis* Philippi, 1859, a primary homonym of the elaterid genus *Megalorhipis* Lacordaire, 1857. Philippi based his genus on a new species, *leiboldi*, from Chile. In 1932, Bridwell proposed the new name, and at the same time he synonymized *leiboldi* with *Bruchus picturatus* Fahraeus, apparently on description only.

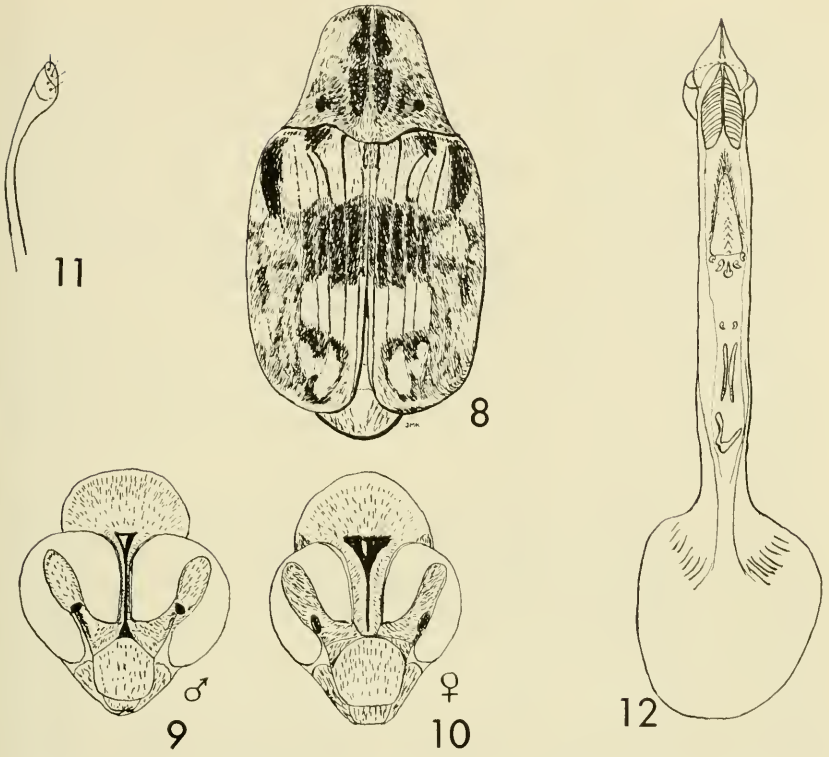
Through the kind help of Prof. Vicente Perez-d'Angello, Museo Nacional de Historia Natural, Santiago, Chile; Dr. Guillermo Kuschel, Department of Scientific and Industrial Research, Nelson, New Zealand; and Dr. Eric Kjellander, Naturhistoriska Riksmuseet, Stockholm, Sweden, I have been able to examine the primary types of *leiboldi* and *picturatus* and to confirm the synonymy proposed by Bridwell.

In neither the description nor the discussion, did Philippi mention the bidentate basal tumescence of the elytra, but they are prominent in both the type-species and in the new species and are characteristic of the genus as it is now understood. The teeth on each tumescence mark the basal ends of the third and fourth striae of each elytron. These striae are rather strongly deflected laterally in the basal fifth to meet the teeth. Fahraeus noted the basal tumescences in his description of *Bruchus picturatus*, but he was not describing a separate genus for the species.

Rhipibruchus picturatus (Fahraeus)

Bruchus picturatus Fahraeus, 1839, *in* Schoenherr, Gen. Curcul. V:2; Blanchard, 1851, *in* Gay, Hist. Chile, p. 289, Pl. 22, fig. 1.
Megalorhipis leiboldi Philippi, 1859, Anal. Univ. Chile 16: 668.
Megalorhipis leyboldi, Pic, 1913, Coleopt. Catal. 55:12. (Misspelling).
Rhipibruchus picturatus, Bridwell, 1932, Ent. Soc. Wash. Proc. 34(6):105.

Length: 2.75–3.0 mm. (apex of pronotum to apex of pygidium). *Width*: 1.50–1.75 mm. (at middle of elytra). *Color*: Reddish brown with darker maculations on elytra and pronotum separated by grayish bands and lines (fig. 1), darker beneath; antennae and legs reddish. *Head* subtriangular, eyes prominent, slightly larger in male (figs. 9, 10); median carina prominent ending dorsally in polished black boss bordered by dense row of gray setae; labrum subpentagonal, rounded apically; vertex finely punctate, densely setose basally, with transverse bare area just dorsad of carinal boss; post-ocular lobe very narrow, fringed with dense white setae. *Antenna*: Male (fig. 1) flabellate in terminal 8 segments; scape clavate and strongly bent, pedicel short, bead like, third segment subtriangular, fourth with lateral process about half as long as that of fifth; fifth through tenth with



Figures 8–12. *Rhipibruchus prosopis,* new species. 8—Dorsal habitus. 9—Male head, cephalic aspect. 10—Female head, cephalic aspect. 11—Male genitalia, left lateral lobe, lateral aspect. 12—Male genitalia, median lobe, ventral aspect.

lateral processes each of which is longer than entire antennal axis, eleventh with long process only slightly shorter than tenth. Female: (fig. 1) First segment cylindrical, slightly bent, second short, bead like; third clavate, fourth through tenth serrate, eleventh oblong, acute. *Pronotum* campaniform, slightly wider than long (ratio 10:9), surface evenly punctate; setal colors: pleurae silvery-grey, antescutellar spot white, median and lateral sulci white intermixed with golden, tumescences with dark brown setae. *Elytra* together slightly longer than wide. Pattern of silvery gray and dark brown arranged in fasciae and patches (fig. 1), scutellum narrow, white, pilose, angulate-emarginate apically. Striae well-marked, punctate, each puncture unisetose, third and fifth interstices slightly wider, all striae regular in apical four-fifths of elytra, second through fifth deflected laterally in basal fifth, basal bidentate gibbosity strongly marked. *Thorax and abdomen* dark reddish-brown beneath, sparsely covered with gray setae and indistinct patches of yellowish setae. *Legs*—front and middle entirely reddish-brown; hind coxa nearly covered with gray setae except for shining elongate median spot; hind femur red with an irregular piceous patch on ventral margin of outer face,

femoral armature composed of a large tooth with serrate posterior margin (fig. 6), hind tibia and tarsi slightly darker than in fore and middle legs. *Pygidium* (fig. 7) obscurely punctate, basally with dense white setae, sparser apically; paired darker lateral patches of setae in female bordered above by white setae. *Male genitalia* (figs. 2, 3, 4, 5) with median lobe elongate, ventral valve cordate, acute, curved ventrad, flanked by crescentic sclerites at apex of median lobe; paired internal sclerites at apical orifice semicircular; sclerites of internal sac: Median sclerite complex, composed of lanceolate dorsal sclerite superimposed upon ventral quadrate sclerite which is strongly serrate on dorsal surface; apical sclerites consisting of a pair of short rods and a pair of minute denticles. Lateral lobes (figs. 2, 5) slender, deeply divided, apices asymmetrically rounded, setose.

A male lectotype of *leiboldi* was selected from the type-series which included one other male and two female lectoparatypes.

The type locality of *leiboldi* is Valdiva, Chile, while that of *picturatus* is given simply as "Chile." Additional records in the literature are: Santiago, Chile (Blanchard, 1851); the states of LaPampa, Sanjuan and Santiago del Estero, Argentina (Bosq, 1943).

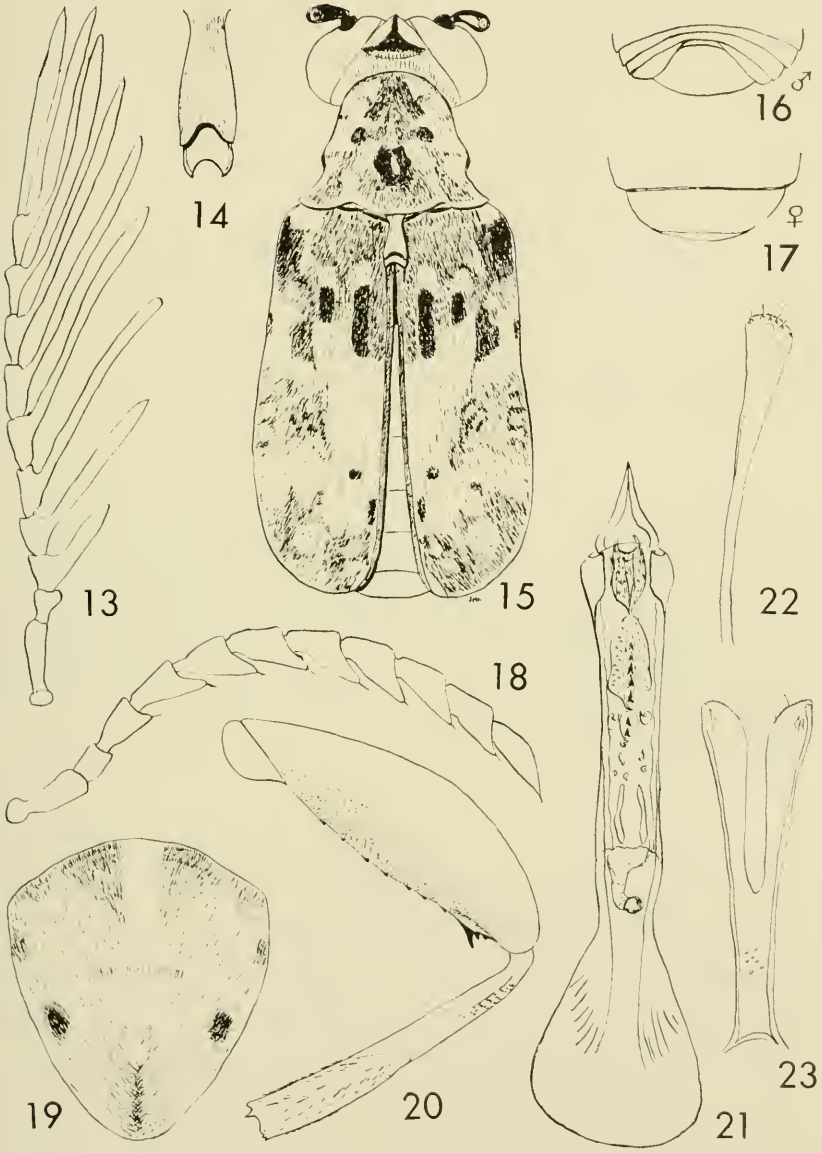
The following records are new:

Chile: Alto de Carmen, July 16, 1924, *ex Prosopis* sp.; Banos el Panque, Vicuna, Coquimba, June 5, 1940, G. Olalquiaga, coll.; Lampa, intercepted in U. S. Plant Quarantine July 16, 1924, *ex Prosopis* sp.; Colina, U. S. P. Q. interception, 1956, *ex Prosopis chilensis* (Nol.) Stuntz. *Colombia*: Cali Valle, April 27, 1939, B. Lozada, coll. *Argentina*: Salta, 1927, *ex Prosopis alba* Griseb., H. L. Parker; various single U. S. P. Q. interceptions, 1917–1943, *ex Prosopis alba* and *juliflora* (Swartz) DC. *Uruguay*: Montevideo, July 25, 1925, *ex Prosopis nandubey* Griseb., Luis Guillot, coll.

Zacher (1952) gives the following hosts for *Rhipibruchus picturatus*: *Prosopis alba* and *siliqusastrum* (Cav.) DC. Bosq (1943) lists *Prosopis nigra* (Griseb.) Hieron., *alba, algarobilla* Griseb. and *humilis* Gill. ex H. & A.

Rhipibruchus prosopis, n. sp.

Length: 2.5–3.25 mm. (apex of pronotum to apex of pygidium). *Width*: 1.5–1.75 mm. (widest part of elytra). *Color*: Integument reddish-brown, vestiture of dark brown, black, yellow, golden, white and cinereous setae. Antennae reddish to piceous. *Head*: (figs. 9, 10) as in *R. picturatus*. *Antenna* with lateral processes slightly longer than in *picturatus* and third segment cucumiform in male; female antenna as in *picturatus*. *Pronotum*: Shape and color as in *picturatus* except width-to-length ratio 10:8. *Elytra* together slightly longer than wide; basal tumescences and striae as in *picturatus*: pattern (fig. 8) with median, lateral and apical areas dark brown with scattered cinereous and golden setae, basal lighter areas composed of intermixed white and golden setae in varying proportions; median dark area sometimes limited laterally by lighter fifth interstice or may extend entirely across elytra. *Thorax* and *abdomen* reddish-brown with cinereous pubescence. *Legs* as in *picturatus*. *Pygidium*: Male as in *picturatus* (fig. 7); female and with identical pattern as in *picturatus* except lateral basal areas usually with yellow pubescence instead of white, median basal triangle of white pubescence. *Male genitalia* (figs. 11, 12) similar to those of *picturatus* but with the following differences: Internal sclerites at apical orifice lanceolate, apex of ventral valve relatively shorter, median sclerite complex, consisting of lanceolate dorsal sclerite superimposed over lanceo-



Figures 13–23. *Pectinibruchus longiscutus* new genus and species. 13—Male antenna. 14—Apex of scutellum. 15—Dorsal habitus. 16—Apex of male abdomen, ventral aspect. 17—Apex of female abdomen, ventral aspect. 18—Female antenna. 19—Pygidium. 20—Hind femur and tibia. 21—Male genitalia, median lobe ventral aspect. 22—Male genitalia, lateral lobe, lateral aspect. 23—Male genitalia, lateral lobes and tegmen, ventral aspect.

late ventral sclerite, the latter bearing five or six short teeth on its dorsal surface, several small individual denticles at bases of lanceolate sclerites; apical sclerites consisting of a pair of long, slender rods and a pair of small denticles. Lateral lobes similar to those of *picturatus* except apices slightly more bulbous in lateral aspect.

Holotype ♂.—Argentina, intercepted in Plant Quarantine inspections, Washington, D. C., Aug. 18, 1952, H. Y. Gouldman, *ex Prosopis strombulifera* (Lam.) Benth. (USNM 69233).

Paratypes.—Same data as holotype, 1 ♂; Uruguay, U. S. P. Q. interception, Hoboken, N. J., Feb. 20, 1940, *ex Prosopis nigra* (Griseb.) Hieron., 1 ♂; Argentina, Chaco, May 13, 1941, H. L. Parker, 2 ♂, 4 ♀; Argentina, intercepted U. S. P. Q., El Paso, Texas, June 13, 1929, *ex* Mesquite, 2 ♂, 2♀. All in U. S. N. M. Collection.

Additional specimens (damaged). Argentina, Oren Salta, Aug. 14, 1917. *ex Prosopis juliflora* (Swartz) DC. All in U. S. N. M. Collection.

Genus **Pectinibruchus**, n. g.

Body elongate; elytra wider at humeri than prothorax at base (fig. 15); eyes protruding, larger in male than in female, frontal carina prominent; male antennae strongly pectinate (fig. 18); pronotum campaniform, convex, tumescent at middle of base, lateral tumescences obsolete, lateral carina absent; mesepimeron obsolete in ventral half due to encroachment of mesepisternum; scutellum greatly elongated, clavate, quadridentate apically (fig. 14); elytral striae slightly distorted basally, no basal tumescences nor denticles; legs slender, hind femur as in fig. 20, mucro absent on hind tibia, front and middle trochantins fused with body wall; pygidium nearly vertical, with paired lateral dark spots in both sexes (fig. 19).

Type species.—*Pectinibruchus longiscutus*, new species (monobasic).

Range.—Argentina.

Pectinibruchus longiscutus, n. sp.

Length: 3.5–4.0 mm. (apex of pronotum to apex of pygidium). *Width*: 2.0–2.25 mm. (widest part of elytra). *Color*: Integument various shades of dark brown and brownish-yellowish; antennae yellowish with darker basal spots; body vestiture of dark brown, light brown and cinereous hairs arranged in fairly definite pattern on elytra and pronotum; thorax and abdomen beneath with cinereous hairs. *Head* with eyes very large in male (as in fig. 9), somewhat smaller in female, deeply emarginate over insertions of antennae, postocular lobe reduced to narrow fringe of setae; frontal carina prominent, ending dorsally in flat, triangular boss; labrum subpentagonal, clypeus semicircular. *Antenna* of male (fig. 13) with scape cucumiform, curved slightly and flattened around eye, flagellum elongate-pectinate; female with scape cucumiform, slightly bent, pedicel strongly serrate. *Pronotum* campaniform, lateral margins strongly sinuate (dorsal aspect), inflated at middle, basal margin sinuate, medial lobe broad and shallow; lateral carina absent, postocular carina short, obsolete dorsally; disk convex, surface uneven, median basal tumescence shallowly sulcate, lateral basal tumescences obsolete, marked by glabrous spots, paired glabrous spots just anterior of basal tumescences, shallow concavities near apex on either side of convex median ridge. *Elytra* together

subrectangular, slightly separated at apices in most specimens, together 1.3 times as long as wide, slightly wider at apical fourth than at humeri, apices at suture finely serrate and setose, apical margins broadly rounded, lateral margins nearly straight; striae mostly regular except slightly deflected laterally in basal one-eighth, interstices 3, 5, and 7 slightly wider; color pattern as in fig. 15, basal third more extensively dark in some specimens, lightly colored areas variable in extent and composed of cinereous and light brown intermixed hairs superimposed upon yellowish-brown integument, darkly colored areas composed of chocolate brown hairs on dark brown integument. Scutellum much elongated, clavate, concave and quadridentate apically (fig. 14); no basal tumescence on third and fourth striae. *Thorax and abdomen* dark brown beneath or lighter brown in some males; vestiture sparse, cinereous; pygidia nearly alike in the sexes (fig. 19), dark lateral spots more pronounced in female, apex bent under in male with sternites narrowed medially. *Legs* somewhat elongated and slender; front and middle legs yellowish-brown to piceous, lightly mottled; hind coxa finely punctate except for median lanceolate glabrous area, punctate area lightly clothed with fine cinereous setae; hind femur (fig. 20) moderately thickened, yellowish-brown above, piceous below, femoral tooth serrate on posterior margin; hind tibia slender, nearly straight with small terminal denticles, mucro absent, dark spot at middle of posterior margin, lateral carina obsolete in apical half; basitarsus two-thirds as long as hind tibia and slightly longer than remaining four segments of tarsus. *Male genitalia* (figs. 21, 22, 23) with median lobe slender, lightly sclerotized except at apex, base ovate; ventral valve triangular, partially enclosed at base by paired lateral crescentic sclerites; paired internal, bristly lanceolate sclerites marking apical orifice; internal sac with median sclerite complex, consisting of thin, hoodlike, rugose sclerite superimposed over slender sclerite which bears a dorsal row of about five teeth; auxiliary denticles and a pair of rod-like sclerites as illustrated; juncture of apex of internal sac and common ejaculatory duct marked by thin sclerotized ring. Lateral lobes (fig. 23) slender, deeply divided, apices obliquely truncated, each with a lateral expansion (fig. 22) which extends ventrad partially enclosing apex of median lobe.

Holotype ♂.—Argentina, Conesa, Feb. 21, 1943, Paul A. Berry, coll., *ex Prosopis* sp. (USNM 69234).

Paratypes.—Same data as holotype, 2 ♂, 4 ♀; Argentina, Challaco, near Neuquen, N. Patagonia, May 5, 1920, E. Kirk, coll., 1 ♂; Argentina, LaPlata, U. S. P. Q. interception, Washington, D. C., April 23, 1920, *ex Prosopis panta* Griseb., 1 ♀; Argentina, Rio Negro, December 2, 1924, H. Y. Gouldman, Coll., *ex Prosopis* sp., 1 ♀; Argentina, U. S. P. Q. interception, Washington, D. C., Aug. 18, 1952, *ex Prosopis* sp., 3 ♀. *Additional specimens.*—Argentina, Rio Negro, Dec. 2, 1924, H. Y. Gouldman, *ex Prosopis* sp., 24 fragmentary specimens not suitable for paratype material. All specimens in U. S. N. M. Collection.

Discussion

Pectinibruchus is most closely related to *Rhipibruchus* in the strongly pectinate male antennae, enlarged male eyes, shape of the tooth of the hind femur, median basal pronotal tumescence, lateral dark spots on the pygidium, details of the male genitalia, and promi-

nent frontal carina. It differs in the elongated axial portion of the male antennal segments, absence of lateral basal pronotal tumescences, lack of a basal tumescence on the third and fourth elytral striae, elongated quadridentate scutellum, elongated body and the lack of a mucro on the hind tibia.

Pectinibruchus and *Rhipibruchus* belong to the subfamily Bruchinae since the mesepimeron is remote from the mesecoxal cavity as a result of encroachment of the mesepisternum (see Bridwell, 1934, p. 103). The most striking common characteristics of these two genera are the strongly pectinate antennae and the enlarged eyes in the male. These two specializations are also found in *Megacerus* Fahraeus and in *Kytorhinus* Fischer von Waldheim, but are obviously parallel developments because other generic characteristics indicate very remote relationships with *Rhipibruchus* and *Pectinibruchus.* In certain species of *Callosobruchus* (e.g. *chinensis* (L.), pectinate antennae are present but are never as well developed. *Pectinibruchus* is apparently on a highly specialized side branch of the phyletic stem leading to *Rhipibruchus.* The exaggerated antennae and scutellum and the lack of a basal elytral tumescence can all be specializations of those characteristics in *Rhipibruchus,* and several characteristics indicate a close relationship between the two genera.

If *Rhipibruchus* can be considered the most primitive of the two genera, through it relationships can be postulated with other species now placed in *Acanthoscelides* Schilsky, *Caryedes* Hummel, *Gibbobruchus* Pic, *Merobruchus* Bridwell, *Pseudopachymerina* Zacher and *Phelomerus* Pic. Characteristics possessed by some or all members of these genera and loosely holding them together are the strong frontal carina, laterally deflected discal striae of the elytra ending basally in a bidentate tumescence or row of prominent denticles, pronotal disk with median and lateral tumescences well-developed or indicated near basal margin, and a campaniform pronotum usually much narrowed apically. The latter six genera all possess to some degree an incrassated hind femur and multiple femoral teeth, and the condition in *Rhipibruchus* and *Pectinibruchus* possibly represents a reduction in proportions of the hind femur and in dentition.

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LECTOTYPE ASSIGNMENTS FOR SEVERAL SPECIES OF THE GENUS CULEX IN SOUTHEAST ASIA (DIPTERA: CULICIDAE)[1]

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During the summer of 1966, visits to European institutions with the purpose of studying types and other specimens of the mosquito genus *Culex* from Southeast Asia revealed the need to designate lectotypes for a number of species. Most of the lectotype assignments are included in Bram (Cont. Amer. ent. Inst. 2(1):1–296, 1967); however, the following species are not known to occur in Thailand and must, therefore, be treated independently.

Culex (*Culex*) *alis* Theobald (Monograph of the Culicidae 3:167, 1903). Lectotype hereby designated: syntype male (terminalia slide mounted), "Xmas Is., 13. XII. 02," [Christmas Island, Australian dependency], in the British Museum (Natural History).

Culex (*Culex*) *christophersii* Theobald (Monograph of the Culicidae 4:453, 1907). Lectotype hereby designated: syntype male (terminalia mounted and attached to pin), "India, Christophers, recd. from F. V. Theobald, 1907–29," in the British Museum (Natural History). Examination of the lectotype confirms the action of Barraud (The Fauna of British India, Diptera 5:420, 1934) in placing this name in synonymy with *Culex* (*Culex*) *fatigans* Wiedemann (= *pipiens quinquefasciatus* Say).

Culex (*Culex*) *quasipipiens* Theobald (Monograph of the Culicidae 2:136, 1901). Lectotype hereby designated: syntype female, "99, Sambalpur, Central Provinces, India, D. O'C. Murphy," in the British Museum (Natural History). Examination of the lectotype confirms the action of Barraud (op. cit.) in placing this name in synonymy with *Culex* (*Culex*) *fatigans* Wiedemann (= *pipiens quinquefasciatus* Say).

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Culex (*Culiciomyia*) *shebbearei* Barraud (Indian J. med. Res. 12:19, 1924). Although no type labels had been affixed to any specimens of this species in the British Museum collection, there are four specimens (2 ♂♂, 2 ♀♀) with the precise data as that given in Barraud's original description. There is little doubt that these four specimens represent at least part of the original type series and that the following lectotype assignment is valid. Lectotype hereby designated: male (terminalia slide mounted), "E. Himalayas: Kurseong, 4500 ft., Bred, IX 1922, P. J. Barraud, B. M. 1930.446," in the British Museum (Natural History).

Culex (*Culiciomyia*) *viridiventer* Giles (J. Bombay nat. Hist. Soc. 13:609, 1901). Lectotype hereby designated: syntype male (terminalia mounted and attached to pin), no data other than the syntype and lectotype labels, in the British Museum (Natural History).

Culex (*Culiciomyia*) *angulatus* Theobald (Monograph of the Culicidae 2:324, 1901). Lectotype hereby designated: syntype female, "Naini Tal, N. W. P., Col. Giles," in the British Museum (Natural History). Comparison of this lectotype with the type series of *viridiventer* confirms the acton of Edwards (Bull. ent. Res. 4:235, 1913) in placing *angulatus* in synonymy with *viridiventer*.

Culex (*Acallcomyia*) *obscurus* (Leicester) (The Culicidae of Malaya:194, 1908). Lectotype hereby designated: cotype female, "Kuala Lumpur, Fed. Malay States, Dr. G. F. Leicester, 1912–35, 18/7/04, A," in the British Museum (Natural History). The lectotype was selected from a series of four cotype females and one cotype male. Unfortunately the cotype male is badly damaged and the terminalia has been removed but is apparently lost.

Culex (*Lophoceraomyia*) *flavicornis* Barraud (Indian J. med. Res. 12:45, 1924). Lectotype hereby designated: type male, "S. India: Nilgeor Hills, Oct. 1915 (Khazan Chand), Capt. P. J. Barraud, B. M. 1926–262," in the British Museum (Natural History).

Culex (*Lophoceraomyia*) *jenseni* (de Meijere) (Ann. bot. Gdn. Buitenz. Suppl. 3:922, 1910). Although no type labels were affixed to any specimens, series of specimens with precise data as indicated in the original description and which are undoubtedly syntypes have been deposited in both the Zoological Museum, Amsterdam University, Amsterdam and in the Rijksmuseum van Natuurlijke Historie, Leiden. Stone, Knight, and Starcke (A Synoptic Catalog of the Mosquitoes of the World (Diptera: Culicidae):234, 1959) listed the location of the type (sex and number not specified) as the "Rijksmuseum, Amsterdam," Stone (Proc. ent. Soc. Wash. 65:139, 1963) subsequently corrected this to "Division of Entomology, Zoological Museum, Amsterdam University." Colless (J. med. Ent. 2:303, 1965) listed the location of the type male as "Rijksmuseum." However, Colless (pers. comm.) copied this location from Stone, Knight, and Starcke (op. cit.) without reference to the corrected version in Stone (op. cit.). Considering this confusion, it is felt that the best procedure is to designate a lectotype as follows: syntype male (terminalia mounted and attached to pin), "Java, Tjibodas, uit Nepenthes, Jensen, 1909, No. 32," in the Zoological Museum, Amsterdam University.

Acknowledgment is made to Dr. P. F. Mattingly for permitting examination of specimens in the British Museum (Natural History); Dr. C. A. W. Jeekel for help at the Zoological Museum Amsterdam University; and Dr. P. J. van Helsdingen of the Rijksmuseum van Natuurlijke Historie.

NEW SPECIES OF MICROMORPHUS FROM THE UNITED STATES AND MEXICO

(DIPTERA: DOLICHOPODIDAE)

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The genus *Micromorphus* was first reported from the Western Hemisphere by Parent in 1929 with the description of *M. fulvosetosus* from Texas. During the next decade a number of other species were described, *M. plebeius* Parent of Brazil, *M. panamensis* Van Duzee of of Panama, and *M. micidus* Parent of Costa Rica. In addition two previously described species, *Achalcus caudatus* Aldrich of the West Indies and *Neurigona minima* Van Duzee of Eastern North America have proved to be species of *Micromorphus*. More recently (1964) I have described two new species and recognized a total of five species from the Eastern United States. The present paper includes descriptions of four additional new species from the Western United States and from Mexico.

Of the described species, I find *Micromorphus panamensis* indistinguishable from what I consider *M. albipes*, I would exclude *M. micidus* from the genus, and *M. plebeius* is based on a female specimen. At present I would recognize the following ten American species of *Micromorphus*.

KEY TO AMERICAN SPECIES OF **Micromorphus** MIK

1. Face rather narrow, bordered with gray pollen; front wholly light brown or gray 2
   At least upper part of face and lower part of front covered with dark brown pollen without obvious gray border 6
2. Hind tibia without evident posterodorsal 3
   Hind tibia with a small but distinct posterodorsal 4
3. Hypopygium asymmetrical, strongly swollen on one side (Fig. 5) (Mexico) ..... **M. asymmetricus**, n. sp.
   Hypopygium essentially cylindrical (Texas, Mexico) ..... **M. fulvosetosus** Parent
4. Apex of hypopygium oblique with upper edge sharply projecting, a tuft of stiff black hairs on apical surface (Fig. 4) (Mexico) ..... **M. lithophilus**, n. sp.
   Apical surface not oblique, bearing only rather pale hairs 5
5. Hypopygium bearing only a narrow pubescent appendage (Md., S.C., Fla., Mexico, Costa Rica, Panama, West Indies, Europe, New Zealand?) ..... **M. albipes** (Zetterstedt)
   Hypopygium bearing a small but broad pubescent appendage distally (West Indies) ..... **M. caudatus** (Aldrich)
6. Face of male narrower than that of female, never whitish below, usually distorted in dry specimens; 3rd antennal segment slightly longer than broad with arista borne at middle of dorsal edge 7

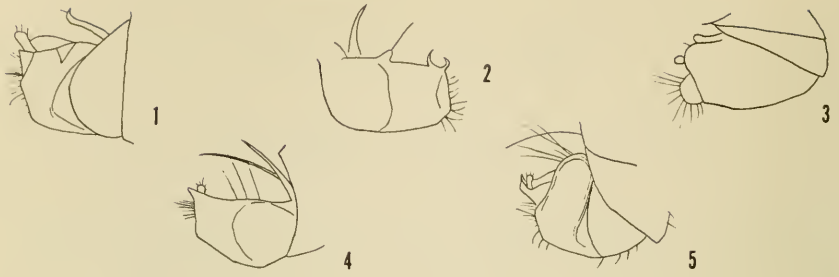

Fig. 1–5. *Micromorphus,* male hypopygia; 1. *M. leucostoma,* n. sp.; 2. *M. knowltoni,* n. sp.; 3. *M. bifrons* Robinson; 4. *M. lithophilus,* n. sp.; 5. *M. asymmetricus,* n. sp.

Face of male very broad, as broad as in female, often whitish below, rarely distorted in dry specimens; 3rd antennal segment as broad as long with arista borne slightly beyond middle of dorsal edge 8

7. Hypopygium without evident appendages, with a tuft of long hairs on tip (N.Y., Quebec) ..... **M. minimus** (Van Duzee)
   Hypopygium with a pair of very long slender lamellae, without long apical hairs (Ga., Tenn., N.C.) ..... **M. longilamellatus** Robinson
8. Face without white pollen on lower part; hypopygium with only small slender apical appendages (Fig. 2) (Utah) ..... **M. knowltoni,** n. sp.
   Face with white pollen on lower part; hypopygium with a pair of short pubescent apical appendages 9
9. White pollen on face restricted to area above suture; hypopygial appendage broad, bearing many long setae (Fig. 3) (Iowa) ..... **M. bifrons** Robinson
   White pollen covering entire lower half of face; hypopygial appendage narrow, bearing a few short hairs (Fig. 1) (Washington) **M. leucostoma,** n. sp.

The following four species are previously undescribed.

Micromorphus leucostoma, n. sp.
(Fig. 1)

Male.—Length 1.8 mm; wing 1.6 mm by 0.7 mm.

Face very wide above, half as wide below, upper half covered with black velvety area which extends above antennae onto lower third of front, lower part of face covered with white pollen; front broad with sides diverging from base, with yellowish pollen above toward middle and grayish pollen toward side; palpus brown with gray pollen and numerous pale hairs; proboscis brown. Antenna black; segment 1 short, broadened toward tip, bare above; segment 2 slightly broader and nearly as long as first, ringed with small dark setulae; segment 3 half again as long as second, rather triangular, covered with fine hairs, with arista inserted a little beyond middle of dorsal edge. Lower postocular setae pale.

Thorax rather gibbous with posterior slope of mesoscutum flattened; dark with yellow pollen on mesoscutum and scutellum, more grayish pollen on pleura, hind margin of scutellum yellowish. Bristles yellowish; acrostichals lacking; 6 pairs of dorsocentrals; 1 pair of scutellars; 1 rather small bristle above fore coxa.

Middle and hind coxae infuscated at base, last segments of tarsi and hind tarsus from tip of segment 1 brown, legs otherwise yellow. Hairs and bristles mostly pale; fore and middle coxae with numerous hairs on anterior surface, fore coxa with a series of larger setae along distal margin, middle and hind coxae with a rather small external seta; middle and hind femora with a preapical seta; fore tibia without distinct bristles; middle tibia with 1 anterodorsal and a smaller posterodorsal near basal third, 3 distinct apicals; hind tibia with 1 anterodorsal and 1 posterodorsal near basal third, 1 posterodorsal near distal third, 2–3 apicals. Lengths of segments of fore tarsus from base as 7–3–2–2–2; middle tarsus as 9–4–3–2–2; hind tarsus as 5–5–3–2–2.

Wing rather oval, clear with brown veins; vein 3 nearly straight, vein 2 diverging from it slightly, vein 4 nearly parallel to 3 beyond crossvein and ending slightly behind wing apex; crossvein nearly perpendicular to base of vein 4, about two-fifths as long as last of vein 5; vein 6 represented by slight fold. Calypter, its setae, and the halter pale.

Abdomen only slightly longer than thorax, dark with slight grayish pollen toward sides and base; pubescence pale, marginal setae toward side of first tergum rather prominent. Hypopygium (fig. 1) small, brown, with only small appendages, with numerous fine hairs over the blunt apical surface.

Female with head and parts of legs broken off, but otherwise showing differences only in genitalia.

Holotype ♂ and allotype ♀, from O'Sullivan Dam, Grant Co., Washington, July 22, 1954, M. T. James. Specimens in USNM, No. 69344.

The new species is one of three known to me having the face broad and apparently resistant to distortion as the specimen dries. Of the other two, *Micromorphus knowltoni,* described below, is distinct in the complete lack of white pollen on the face, and *M. bifrons* Robinson of Iowa has a smaller less distinct white pollinose area on the face. Each of the three species has distinctive hypopygia, that of *M. leucostoma* being unusually short and stout.

Micromorphus knowltoni, n. sp.
(Fig. 2)

Male.—Length 1.4 mm; wing 1.7 mm by 0.6 mm.

Face very broad, about two-fifths as broad below as above, divergent margins continuing along sides of the broad front; brown velvety area covering face and extending onto lower margin of front; a few pale reflections above the clypeus, most of front with light brownish pollen; palpus and proboscis brown, former with a small black apical seta. Antenna brown, segment 3 broken off, remaining parts as in *M. leucostoma.* Lower postocular setae pale.

Thorax mostly as in *M. leucostoma,* brown with yellowish pollen above and grayish pollen toward the sides and on the pleura; 1 strong bristle above fore coxa.

Outer surfaces of middle and hind coxae and sometimes part of fore coxa infuscated, distal segments of tarsi brownish, legs otherwise pale. Most hairs and bristles of legs rather pale; coxae and femora as in *M. leucostoma*; fore tibia without evident bristles; middle tibia with a distinct rather dark anterodorsal above

the middle, 3 strong apicals; hind tibia with a strong anterodorsal near basal third, 2 small posterodorsals all rather dark, 2–3 small apicals. Lengths of segments of fore tarsus from base as 10–5–4–3–3; middle tarsus as 12–7–5–3–3; hind tarsus as 8– others broken off.

Wing rather oval, clear with veins pale toward base; veins 2, 3, and 4 nearly straight and parallel beyond crossvein, vein 4 diverging slightly toward tip and ending at or just after wing tip; crossvein perpendicular to base of vein 4, two-fifths as long as last of vein 5; vein 6 represented by very slight fold. Calypter and halter yellow, setae of former pale.

Abdomen about as long as thorax, greenish brown dulled with considerable gray pollen; pubescence pale. Hypopygium (fig. 2) brownish, small, with numerous pale hairs on flattened apical surface and a few very short slender brownish appendages toward the upper side.

Female with face only slightly wider than in male, about half as wide below as above; antennal segment 3 triangular, about as long as broad, with arista inserted just beyond middle of dorsal margin; lengths of segments of hind tarsus as 8–9–6–4–4.

Holotype ♂ and 4 ♀ paratypes, Clear Creek Canyon, Utah, July 14–16, 1946; allotype ♀, Long Valley, Utah, July 4, 1946, all G. K. Knowlton. Specimens in the Iowa State University collection, Ames, Iowa.

The species is closely related to both *Micromorphus leucostoma*, described above, and *M. bifrons* Robinson of Iowa, both of which have similar wide faces. In *M. knowltoni*, however, there is essentially no white pollen on the face and the hypopygium bears only very small slender appendages.

Micromorphus asymmetricus, n. sp.

(Fig. 5)

Male.—Length 1.4 mm; wing 1.4 mm by 0.6 mm.

Face narrow below, less than a fourth as wide as above, with sides running nearly parallel slightly above the clypeus, the narrow white pollinose margins sharply demarcated from the central black triangle; front broad with diverging sides continuous with those of face, covered with light brownish pollen; palpus black, proboscis brown. Antennae and postocular area as in *M. leucostoma*.

Thorax similar to *M. leucostoma*, with brownish yellow pollen above, more grayish pollen toward side and on pleura; tip of scutellum rather pale; bristles light brownish, 1 large seta above fore coxa.

Bases of coxae slightly infuscated, distal segments of tarsi brownish, legs otherwise pale. Fore and middle coxae with numerous pale hairs anteriorly the distal ones longer, middle and hind coxae with a rather pale external bristle, other hairs and bristles of legs mostly dark; middle and hind femora with a preapical seta; fore tibia without evident bristles; middle tibia with an anterodorsal and a posterodorsal near base, 3 apicals; hind tibia with 1 small anterodorsal near basal third, 3 very small apicals. Lengths of segments of fore tarsus from base as 12–6–4–3–2; middle tarsus as 16–8–5–4–3; hind tarsus as 8–10–6–4–4.

Wing rather oval, clear with brown veins; vein 3 nearly straight, vein 2 slightly divergent; vein 4 slightly curved, equally far from 3rd at crossvein and near tip, ending slightly behind wing tip; crossvein perpendicular to last of vein 4, a third to a half as long as last of vein 5; vein 6 represented by a slight fold. Calypter, its setae, and the halter rather pale.

Abdomen about as long as thorax, tapered toward tip; mostly blackish with slight grayish pollen toward side and base; hairs and bristles rather yellowish brown. Hypopygium (fig. 5) small, dark brown, distinctly swollen near tip on left side; a few short, upwardly curved appendages and a small tuft of pale hairs at tip.

Holotype ♂, Aug. 4, and 1 ♂ paratype, Aug. 5, 1962, from moist calcareous rock surfaces, in a small shaded ravine about 5 km south of Tamazunchale, San Luis Potosi, Mexico. Holotype in USNM No. 69345; paratype presently in my collection.

The species is one of the narrow faced group related to *Micromorphus albipes* Zetterstedt. The new species is quite distinct in the very asymmetric hypopygium and the hind tibia completely lacking posterodorsals.

Micromorphus lithophilus, n. sp.
(Fig. 4)

Male.—Length 1.3 mm; wing 1.3 mm by 0.6 mm.

Face narrow below, about a third as wide as above, with the diverging sides straight, covered with blackish velvety areas with paler reflections along the margins of the eyes; front broad with diverging sides continuous from face, covered with a dull brownish pollen; palpus and proboscis black. Antenna essentially as in *M. leucostoma*, segment 3 slightly broader than long. Lower postocular setae pale.

Thorax as in *M. leucostoma*.

Bases of middle and hind coxae and sometimes base of fore coxa infuscated, distal segments of tarsi dark, legs otherwise mostly pale. Fore and middle coxae with numerous pale hairs anteriorly, longer setae distally, middle and hind coxae with a rather dark external seta, otherwise hairs and bristles of legs dark; middle and hind femora with a preapical seta; fore tibia without evident bristles; middle tibia with a small anterodorsal and a small posterodorsal near basal third, 3 apicals; hind tibia with an anterodorsal and a posterodorsal near the basal third and a very small posterodorsal near distal third, 3 apicals. Lengths of segments of fore tarsus from base as 10–5–4–3–3; middle tarsus as 12–6–5–3–3; hind tarsus as 6–9–5–4–4.

Wing rather oblong oval, clear with blackish veins; veins 3 and 4 nearly straight and parallel beyond the crossvein, vein 2 very slightly diverging; crossvein nearly perpendicular to last of vein 4, about half as long as last of vein 5; vein 6 represented by slight fold. Calypter and halter sometimes darkened, former with light brownish setae.

Abdomen about as long as thorax, tapered to tip, blackish with grayish pollen toward base and sides; hairs and bristles brownish, paler toward sides of terga. Hypopygium (fig. 4) small, dark brownish, with apical surface oblique and bearing a tuft of stiff black setae in the middle, upper edge of the apex projecting.

Female with face slightly wider, with a wider pale margin along the side.

Holotype ♂, allotype ♀, 9 ♂, and 6 ♀ paratypes, from moist shaded calcareous rock, in a small ravine about 5 km south of Tamazunchale, San Luis Potosi, Mexico, Aug. 4–5, 13–14, 1962, H. Robinson. Holotype (No. 69347) and allotype in USNM; others presently in my collection.

The species is very closely related to *Micromorphus albipes* Zetterstedt but differs by the darker center of the face and by the more pointed hypopygium bearing a tuft of black setae.

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DOLICHOMOTES NAVEI, A NEW GENUS AND NEW SPECIES OF PYEMOTID MITE

(Acarina: Pyemotidae)

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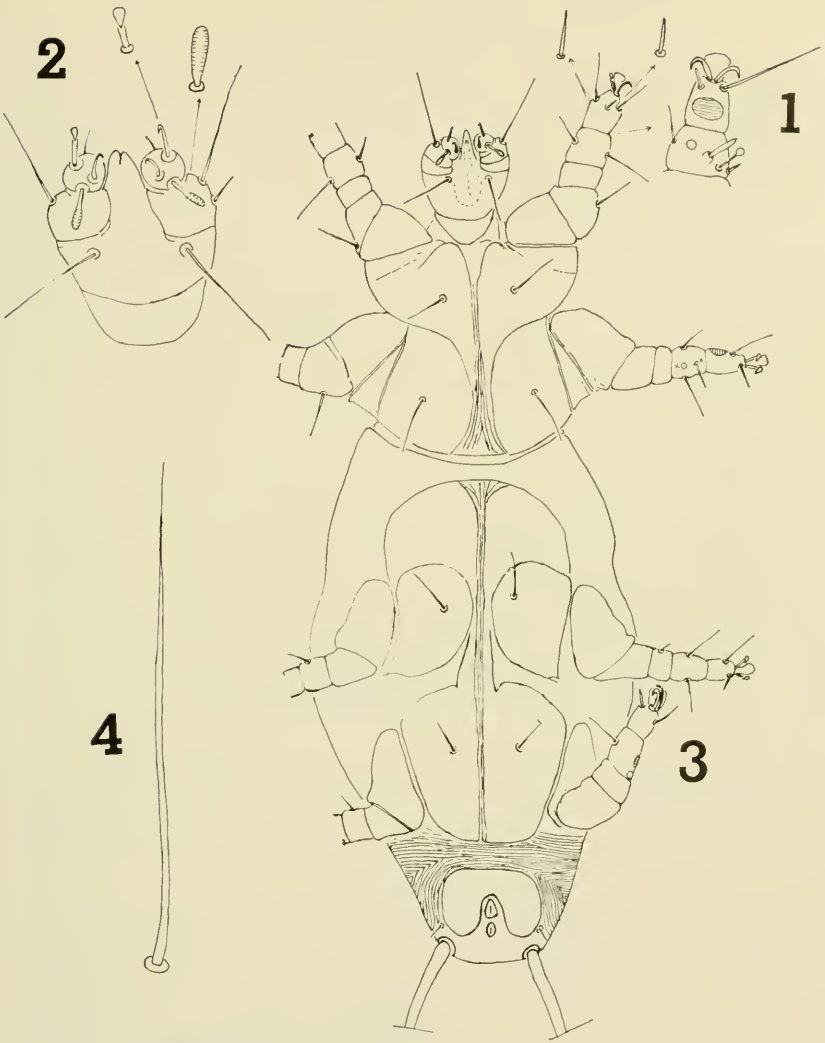
The tarsonemine family Pyemotidae includes more than 120 known species, some of which are of medical or agriculture importance (Cross 1965). Krantz (1957) erected the genus *Dolichocybe* for a pyemotid mite that possesses unusual morphological characters: the hysterosoma which is divided into four segments with transverse striae separating the genital plate from the fourth pair of coxal plates; a pair of long posterior ventral whiplike setae; and an elongated gnathosoma. The genus here described is similar to Krantz's and may be separated by the following characters: the reduction in body and leg setation, the longitudinal striation separating the coxae medially, and the absence of the pseudostigmatic organs.

Dolichomotes, n. g.

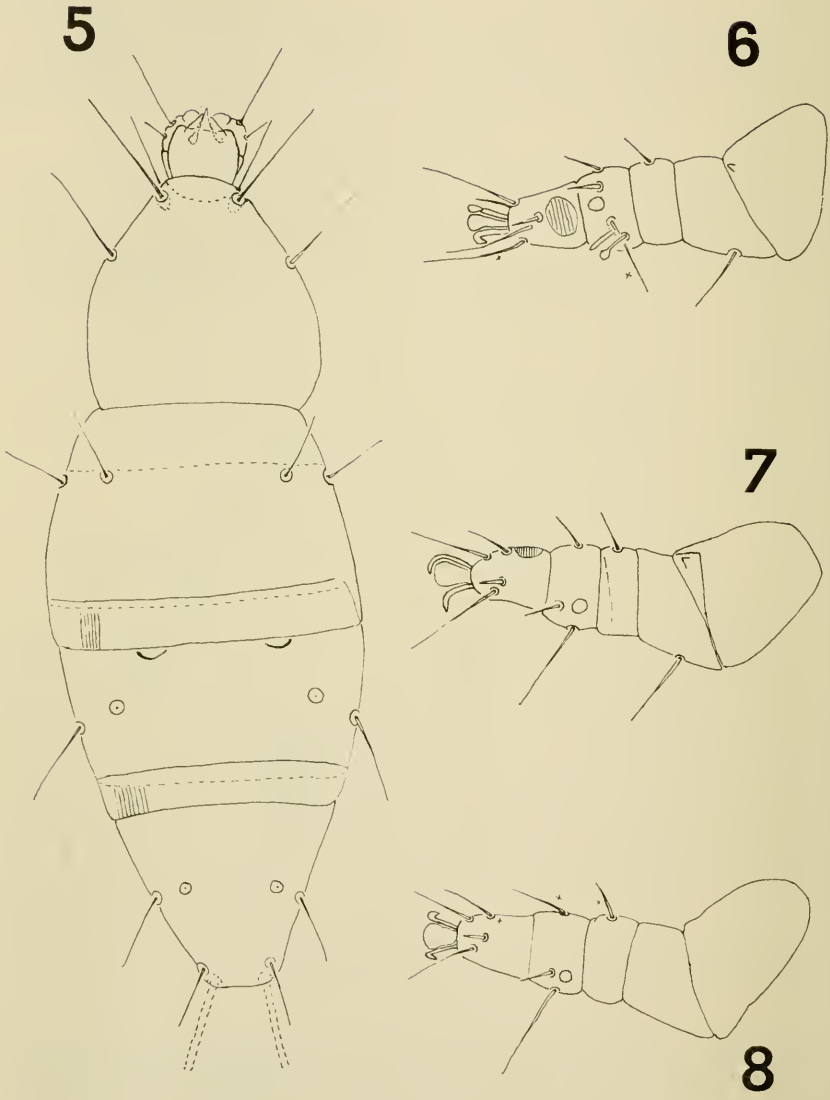
Type-species: Dolichomotes navei, new species.

Gnathosoma of female oval and tapering; palpal tarsus possessing two distinct short claws and solenidion. Idiosoma long and slender, tapering, truncate posteriorly, and terminating with a pair of long strong simple setae ventrally. Legs I–IV similar in size and segmentation; each with two claws and empodium; tarsi I and II with a large striated disclike sensory seta (fig. 1); and tibiae I–IV similar by having a smaller sensory organ. Propodosoma without pseudostigmatic organs.



Figs. 1–4, *Dolichomotes navei*, n. sp.: 1, tarsus I, dorsal, ♀; 2, venter of gnathosoma, ♀; 3, venter, ♀; 4, posterior ventral seta.

Although this species lacks the globoid-shaped pseudostigmatic organs on the propodosoma, it has a pair of long slender sensilla arising from deep, specialized pits. The sensilla may be serving the same purpose as the pseudostigmatic organs. Cross (1965) reports that the pseudostigmata and the pseudostigmatic organs are not present in the genera *Paracarophenax* Cross, *Acarophenax* Newstead and Duvall, and *Adactylidum* Cross.



Figs. 5–8, *Dolichomotes navei*, n. sp.: 5, dorsum, ♀; 6, leg I, ♀; 7, leg II, ♀; 8, leg III, ♀.

Dolichomotes navei, n. sp.
(Figs. 1–8)

Female. Body elongate and broadest in medial region of hysterosoma. Gnathosoma as wide or slightly wider than long; palpal tarsus (fig. 2) with a pair of short curved claws, a microseta, and a solenidion; palpal tibia with long slender seta and microseta laterally. Propodosoma longer than wide; dorsally with two pairs of simple lateral setae subequal in length and a pair of longer slender simple sensory sensilla. Hysterosoma long and slender, tapering and becoming truncate posteriorly; with a pair of long strong simple caudal setae; dorsum divided into three distinct segments. First segment with two pairs of simple setae, a lateral and a medial pair. Second segment with one pair of lateral simple setae slightly longer than those of the first segment and medial setae consisting of base only and with a pair of anterior internal sclerotized structures. Third segment with two pairs of marginal simple lateral setae subequal in length and the remnants of a third pair medially; posterior and ventrally with a pair of long strong simple setae about as long as length of hysterosoma and a pair of microsetae at posterior lateral margin of genital plate. Ventral propodosomal and hysterosomal setae subequal in length. Coxal plates large and distinct, separated from each other medially by striae; transverse striae also in area between coxae IV and genital plate. Coxae I with a single pair of setae, slightly shorter than pair on coxae II; coxae III with single pair of setae slightly longer than pair on coxae IV. All tarsi (figs. 6–8) with two well developed claws and empodium. Tarsi I and II similar, with a large striated, disclike sensory seta, a microspur, a pair of simple dorsal setae distally, and a shorter pair of simple seta ventrally. All tibiae similar, each with a small, striated, disclike sensory seta similar to those on tarsi I and II. Legs III and IV similar, without striated disclike sensory seta on the tarsi. Body 145 μ long; 64 μ wide.

Holotype. Female, U. S. National Museum No. 3226; collected on *Areca catechu* L., Hawaii, March 19, 1960 by R. Nave, for whom this species is named.

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NOTES ON THE GENUS THECODIPLOSIS KIEFFER IN NORTH AMERICA, AND SOME GENERIC REASSIGNMENTS

(DIPTERA: CECIDOMYIIDAE)

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No key to the North American genera of Cecidomyiidae will properly separate *Thecodiplosis* from *Contarinia*. Felt (1918, 1925, 1958) distinguished between the two genera on the basis of whether the costa is interrupted at its juncture with R_5. The costa is invariably interrupted in species of both genera.

The most reliable basis for the separation of the adults of the two genera lies in the female postabdomen: in both genera it is long and protrusible, but in *Thecodiplosis brachyntera* (Schwägrichen), the type-species, and in the species which I consider here to belong to the genus, it is not longitudinally striated, and the cerci are ovoid and fleshy; in *Contarinia* the postabdomen is longitudinally striated, and the cerci are long-attenuate, well-sclerotized, and closely juxtaposed laterally. Males of both genera are essentially alike: the tenth tergum and sternum are bilobed and subequal, and the aedeagus is triangular, distally attenuate, and subequal in length to the tenth segment.

Foote (1965) listed nine species in the genus *Thecodiplosis*. Except for the recently named *T. piniresinosae* Kearby, that treatment of the group followed Felt (1918). Only four of the species actually belong there on the basis of the structure of the female postabdomen. These are: *T. cupressiananassa* (Osten Sacken), *T. hudsonici* (Felt), *T. piniradiatae* (Snow and Mills), and *T. piniresinosae* Kearby. *Contarinia constricta* Condrashoff, *C. cuniculator* Condrashoff and *C. pseudotsugae* Condrashoff, also belong to *Thecodiplosis* on the basis of the female ovipositors and larval characters. All the species now assigned to *Thecodiplosis* are associated with twigs or leaves of conifers.

T. cockerelli Felt, reared from pine needles, is here transferred to *Contarinia* on the basis of the female characters discussed above.

Thecodiplosis dulichii Felt fits well the description of *Anthodiplosis* Kieffer (Kieffer, 1913) and is here transferred to that genus. This species has been reared from seeds of a sedge, *Dulichum* sp. *Anthodiplosis* may be separated from all the other North American genera of Contariniini by the fact that the nodes on each flagellomere are unequal in size and the circumfilum on each node is rudimentary with very short loops. The female ovipositor is not protrusible, and each flagellomere of the female antenna has a distal neck two-thirds as long

as the node. The only other species of *Anthodiplosis* is *A. rudimentalis* Kieffer, known from Europe, and reared from heads of *Artemisia vulgaris.*

T. liriodendri (Osten Sacken), causing ocellate leaf galls on the tulip tree, *Liriodendron tulipifera* L., is here transferred to *Thomasiniana* because of the larval characters (Möhn, 1955). Adult males presumably reared from these galls by Felt, fit the description of the genus in Kieffer (1913).

T. quercifolia (Felt), reared from an oak leaf gall made by *Cynips* sp., has three circumfila on each flagellomere and therefore belongs in another tribe, the Cecidomyiini. The proximal circumfilum on the distal node of each flagellomere is not developed into loops but girdles the node closely. The two other circumfila have well-developed loops, but the loops are much longer on one side of the node than on the other. The species is here referred to *Bremia* Rondani.

T. zauschneriae Felt, reared from rosette galls on *Zauschneria californica* Presl., is here transferred to *Contarinia* on the basis of the female characters discussed above.

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THE DISCOVERY OF LISTROPHORUS LEUCKARTI PAGENSTECHER ON MICROTUS PENNSYLVANICUS PENNSYLVANICUS FROM NORTH AMERICA[1]

(ACARINA: LISTROPHORIDAE)

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The mite species *Listrophorus leuckarti* Pagenstecher (the type species of *Listrophorus* Pagenstecher, 1861) was recorded from the meadow vole *Microtus arvalis arvalis* (Pallas). Recent material collected in Canada and the United States extends the distribution of this species to include the Nearctic region. A study of material from the Trouessart collection revealed the following distribution records: Argentina (on host *Mus sylvaticus*); India (on host *Arvicola amphibius*); and France (on host *A. arvalis*). All specimens had been collected by Rollinat and determined by Trouessart. No dates of collection were recorded. The French material from *A. arvalis* was reported by the late Dr. Marc Andre (personal communication) to be homotypes of Trouessart, although not indicated as such.

With these new records, *L. leuckarti* Pagenstecher has been found in the Palearctic, Nearctic, Neotropical, and Oriental realms. The following is the habitat range of *L. leuckarti* in Canada and the United States: Silverwater, Manitoulin Island, Canada, from *Microtus pennsylvanicus pennsylvanicus* collected by Tho Scholten on July 26, 1961, and Cabell and Mason Counties, West Virginia, United States, in August 1966, collected by Jon P. Shoemaker and Susan J. Joy.

The material collected in Canada consists of a single male, six females and two larvae. The material from West Virginia are four males, three females and two larvae. All of these agree in structure with specimens from Argentina, France, and India.

The following description and illustrations of *L. leuckarti* are made from Trouessart homotypes and specimens from West Virginia.

Listrophorus leuckarti Pagenstecher

Male—Body laterally compressed, elongate, narrowing posteriorly, dorsum striate (fig. 2). Legs well-developed. Hair-clasping organ of the typical listrophorid type, with flap-like plates to clasp hairs of host. Opisthosomal length much less than distance between coxa of leg IV and coxa of leg I. Head well-developed, propodosomal and opisthosomal plates prominent. Head plate narrowing to a point at anterior end, extending beyond legs I; posterior portion projecting and partly enclosing coxa I. Propodosomal plates extending from dorsum of

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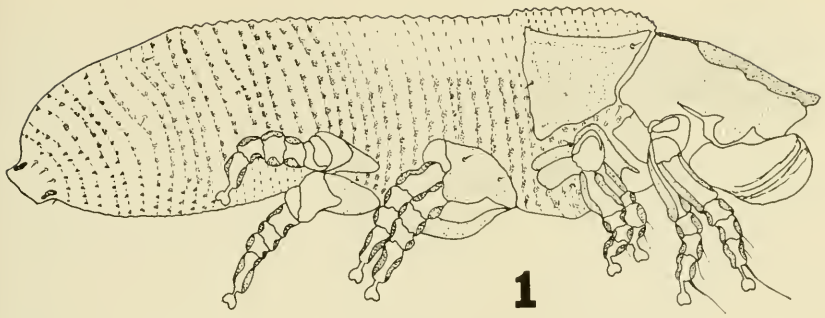

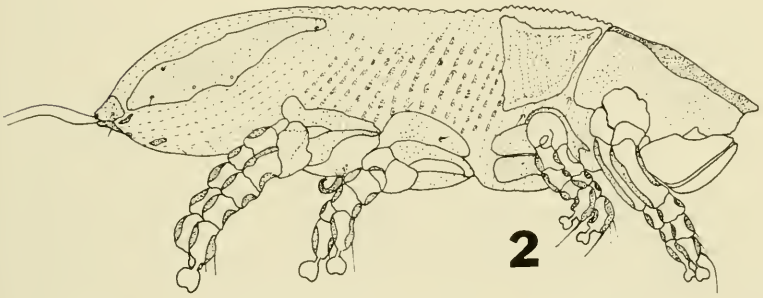

Listrophorus leuckarti Pagenstecher. Fig. 1, lateral view of female; fig. 2, lateral view of male.

body and covering region above second pair of legs but not connected to coxae II, separated from head plate by approximately the width of coxa II. Shape of prodosomal plates rhomboidal, with a single seta placed at the anterior section. Another seta of same shape and size as propodosomal setae between lower section of propodosomal plates and head plate on membranous portion of body. Middle section of dorsum strigose (fig. 2). Two setae similar in structure to propodosomal plate setae on striated region of body, placed between legs II and III, and the other between opisthosomal plate and coxa IV. Opisthosomal plate divided, each portion extending from anal region of body cephalad to coxa IV. The setae of each plate similar in structure to propodosomal plate setae, with a single seta on anterior portion and two on posterior portion of opisthosomal plate (fig. 2). Strial pattern of body around opisthosomal plates different from body region between legs II and anterior portion of opisthosomal plate (fig. 2). Venter of gnathosoma with listrophorid flap-like plates covering sternal area from coxae I to mouthparts. First pair of legs longer than second pair with typical listrophorid arrangement of segments, i.e., with the femur greatly elongated (longer than all other segments combined). Legs II smaller than others. All legs with sclerotized regions associated with apodemes, similar to the division of the propodosomal plate. Plates associated with legs II with a single seta, legs III having two pairs of setae; those with legs I and IV without setae. Two simple

setae between coxae I small, not visible when specimen mounted laterally. A pair of microseta; between apodemes of legs III and also between coxa IV. All legs with conicals. Male genitalia close to legs III on metapodosomal. Aedeagus distinct, well-developed, sickle-shaped, apex bent (fig. 2). Anal suckers small, associated with a sclerotized bar, the suckers and bars not plainly visible when specimen mounted laterally. Anal region with single pair of simple setae divided into two reduced lobes, heavily sclerotized; the divided nature not evident when specimen mounted laterally.

Female—Twice as long as male, with head plate and propodosomal plate similar to male. Body laterally compressed, elongated. Distance between legs IV and posterior end of body subequal to distance between coxa I and coxae IV. Legs similar to those of male, with the first pair longer than second. Legs III and IV equal in length. Propodosomal plate same shape as male (fig. 1); setae similar in structure and placement. Propodosomal plate divided as in male, with two setae on main and largest division, one placed on most anterior section and the other at most posterior region. Striations of dorsum similar to male from propodosomal plate to coxa IV. Striations from coxa of legs IV as shown in fig. 1. Dorsum with four pairs of setae, one pair placed near coxa IV, a second pair caudad of coxa IV approximately length of legs IV, and two pairs near anal section of body. Two pairs of simple setae associated with anal opening. Opisthosomal region without dorsal plate. Genital area enclosed by apodemes of legs III, two small genital suckers present within arch of apodemes; all this region not visible when specimen mounted laterally. Coxal plates of legs III and IV sclerotized, well-developed. Entire venter with striations, similar to dorsum. All legs with conicals. The female may be distinguished by the shape of the propodosomal shield.

Listrophorus leuckarti is separated from all other members of the genus by the shape of the aedeagus (fig. 2), the shape of the propodosomal plate, type of body striations, and male opisthosomal plates. It should be noted that the females of the genus *Listrophorus* are less distinctive, and without the male, species identification is at times extremely difficult. However, the shape of the propodosomal plate and the dorsal striations are the most distinguishing characters of the females.

In the key by McDaniel (1965), *L. leuckarti* was identified as *L. americanus* Radford. The separation of *L. leuckarti* and *L. americanus* presently can be made only on the basis of the structure of the aedeagi. The senior author is presently working on the complex of the genus *Listrophorus* found on muskrats which involves *L. validus, L. doxieri* and *L. americanus*. Until this study has been completed no further distinctions in this complex are possible.

ACKNOWLEDGMENTS

The authors wish to express their appreciation to the late Professor Marc Andre, Laboratoire d' Acarologie, France, for the loan of material of *L. leuckarti* from the Trouessart collection and to Th. Scholten, University of Victoria, Victoria, Canada, for specimens collected by him. The authors also wish to thank Drs.,

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LINEAR COPULATION IN XYLOCELIA FRANCLEMONTI KROMBEIN (HYMENOPTERA: SPHECIDAE)

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Linear copulation, in which both members of the pair are dorsal side up and form a straight or nearly straight line with heads facing away from each other, has seldom been reported in sphecid wasps. As far as I could determine such behavior has only been reported in the cicada killer wasp *Sphecius speciosus* (Drury) by Lin (1966), and Scullen (1965) has published a photograph of a pair of *Cerceris frontata* Say copulating in this position. Evans (1966) mentions only one other case of linear copulation among solitary wasps and that occurred in the eumenid *Monobia quadridens* (Linnaeus). The present account of copulation in *Xylocelia franclemonti* Krombein is another case of linear copulation and therefore seems worth reporting.

Both the Raus (1918) and the Peckhams (1898) reported observing copulation in *X. metathoracica* Mickel and *X. americana* (Packard) respectively, but gave no description of the position. Three observers have noted instances of seemingly unsuccessful mating in species of *Xylocelia*. Thus, Krombein (1958) stated that several males of *X. virginiana* Rohwer attempted unsuccessfully to mate by pouncing on females on the ground. The Raus (1918) noted that such pouncings occurred frequently in *X. metathoracica*. Powell (1963) stated that *X. occidentalis* (Fox) pairs were often observed in what appeared to be unsuccessful mating attempts, but none were seen copulating. These encounters "consisted of a male riding on the back of a female as the latter walked about." The wasps were oriented head over head, but contact of abdomens was not seen. These were at the most 10 or 20 second engagements and "usually terminated at some disturbance such as the pair falling from a grass stem or being bumped by another

male in flight." Similar unsuccessful attempts at mating were observed in the present study.

X. franclemonti (det. H. E. Evans) was found nesting in considerable numbers from 1957 to 1966 in sandy tracts along baseball fields in the Parade Grounds, a huge field in Brooklyn, New York. Colonies of *S. speciosus* are located on these same tracts. The following observations were made during the summers of 1958, 1960, 1965, and 1966. A total of 14 unsuccessful copulatory attempts were observed on nine different days between 11:08 AM and 5:34 PM and between June 18 and August 31. The single copulating pair was observed on July 25, 1965. As the data for *X. metathoracica* (Rau and Rau, 1918), *X. virginiana* (Krombein, 1958), and *X. occidentalis* (Powell, 1963) also suggest, unsuccessful attempts at copulation in *X. franclemonti* are seemingly more common than successful copulation.

In all cases of apparent unsuccessful attempts at mating, a smaller male was mounted on, or mounted a larger female in the position described above by Powell. Five pairs in this position alighted on the ground, and two alighted on a fence. One of the pairs alighted on the ground several times and another on the fence several times. Two pairs were observed resting on plants and in the case of one, a still smaller male was mounted in the same position on the primary male. In seconds they flew away, the female carrying the two males. Five cases were observed of males in flight, pouncing on females to assume the above position. Once there was a brief struggle, the male assumed the usual position on the back of the female, and the pair then flew off, the female carrying the male. On a sixth occasion a pouncing male missed the female, landed next to her, and then flew away. Apparently the same female landed again about 30 seconds later and a male was successful in assuming the usual position on her back.

At least three of the 14 pairs walked about considerably. Once a female walked up to a nest and, apparently because of the male on top of her, was unsuccessful in her attempted entry. She then flew, carrying the male with her. Unsuccessful attempts at copulation in *X. virginiana* were directed at females engaged in nesting activities (Krombein, 1958). A pair of *X. franclemonti* remained on the ground or some other surface for less than a minute on five occasions, and a pair was on a surface for more than a minute on two occasions, the longest being three or four minutes. This was considerably longer than the maximum of 20 seconds reported for *X. occidentalis* by Powell (1963).

In five cases, a male *X. franclemonti* was observed to lash the female with his antennae while mounted on her. On two occasions males lashed the antennae of the female, on three occasions the head. In one of these latter cases the female repeatedly unfolded and folded her wings in what may have been an "attempt" to eject the male. She

then flew off carrying the male with her, and they landed on a plant about eight inches away; they then flew off again.

Seven pairs were observed to fly off together, the female carrying the male, and in some of these cases additional landings and take offs were observed. On one occasion a male alighted on a female, lashed her antennae with his, and after about one minute flew off. On a second occasion a male alighted on a female and then flew away.

On July 25, 1965, a pair of *X. franclemonti* in linear copulation suddenly alighted on the ground in front of me. The male faced in a direction opposite that of the female. The male as in the previous cases was noticeably smaller and thinner than the female. The pair remained where they landed for about 30 seconds, when I placed my pencil next to them. They then climbed the pencil, the female pulling the male. The pair walked about the pencil considerably, the female continuing to pull the male behind her. The pencil was lifted four or more feet above the ground when the pair jumped off and in a spiral manner descended to the ground.

Several aspects of apparent unsuccessful mating behavior have not previously been described in *Xylocelia*. These include the frequent carriage of the male in flight by the female, and the antennal lashing of the head or antennae of the female by the male.

The precopulatory and copulatory behavior of *X. franclemonti* is similar to that of the cicada killer. Copulating cicada killers may fly. Females, usually noticeably larger than males, pull the males after them in walking and are never pulled by the males. Essentially the same precopulatory position is assumed as in *X. franclemonti* with the smaller male over the female, and mating may not take place at all. Nesting females will not mate as is also suggested in the present study in *X. franclemonti* and seems to be the case in *X. virginiana* (Krombein, 1958). Courtship includes the lashing of the female's antennae and head by the male's antennae. A second male is sometimes found in the precopulatory position on top of the first male. Flight frequently occurs in the precopulatory position, but the female is apparently unable to commence flight while carrying more than one male (Lin, 1963, 1966a, 1966b, and personal observation).

I am indebted to Dr. Howard E. Evans for identifying the *Xylocelia*. Funds for the summer of 1965 and 1966 were provided in part by a Sigma Xi Grant-in-Aid of Research.

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A NEW SALDID FROM CALIFORNIA
(HEMIPTERA: SALDIDAE)

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Several years ago, while studying the Usinger Collection, I separated a new species of *Saldula*. I had hoped to include it in a more comprehensive study of the genus, but the need for the new name has prompted me to publish it alone.

Saldula usingeri, n. sp.

Of moderate size, moderately broad, general color black, macropterous. (For all measurements, 60 units = 1 mm.)

Head: Black, feebly shining, surface almost obscured by dense, short, recumbent silvery pubescence; preocellar spot yellowish; with scattered long erect setae in addition to the usual three pairs of long hairs on frons and vertex; ocelli slightly raised and separated by the width of an ocellus; interocular space greater than the width of an eye (20:19); clypeus and anteclypeus testaceous medially, piceous elsewhere.

Thorax: Pronotum black, feebly shining, rugulose, surface almost obscured by pubescence, vestiture as described for head; covered with long black erect setae, very evident at lateral margins when viewed from above; lateral margins very slightly convex to straight, narrowing moderately anteriorly; callus slightly raised, with deep pit in center; anterior lobe longer than posterior lobe (17:8, not including collar); collar wide (5); underparts black, clothed with fine silvery pubescence; scutellum equal in width and length (57:57), with vestiture similar to pronotum, depressed transversely across center.

Wings: Hemelytra fully developed, pubescence and setae as on pronotum; ground color black; for most specimens, the inner corium and clavus are solid velvety black, and the outer corium is feebly shining and marked as in figure 1A; occasionally light spots are found on the inner corium along the corial suture and at the apex along the membrane; membrane fumose to deep fumose, with four cells.

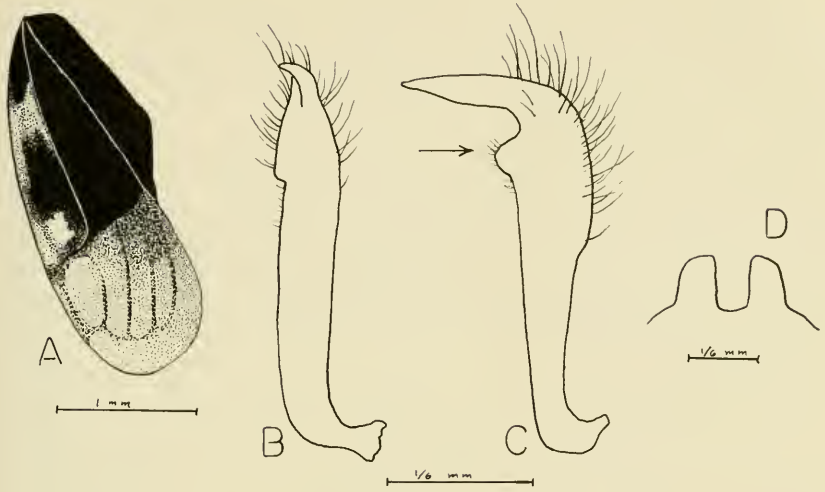

Fig. 1, *Saldula usingeri*, n. sp.: A, left hemelytron; B and C, left male paramere, two views; D, parandria.

Abdomen: Piceous, covered with short, decumbent silvery pubescence; in female, caudal portion of subgenital plate leucine, this plate produced caudad; parandria as shown in figure 1D.

Extremities: Antennal segment 1 testaceous, with deep brown ventral basal stripe; segment 2 deep brown, testaceous on apical third or fourth; segments 3 and 4 deep brown to piceous; as thick as the apex of segment 2, relatively slender for the genus; all segments clothed with short pubescence and scattered longer hairs, the latter longest on segments 3 and 4; proportions as follows:

Holotype ♂: I;20 : II;42 : III;28 : IV:30. Allotype ♀: I;20 : II;48 : III;29 : IV;28.

Legs testaceous, coxae, base and apex of trochanters, base of femora flavous to flavo-testaceous; tibia and tarsal segments darkened apically, tibia with usual dark spines.

Genitalia: Paramere as shown in figure 1B and 1C; filum gonopori coiled one and three fourths times; median sclerotized structures of aedeagus typically *Saldula* like.

Measurements: Holotype ♂, length 3.65 mm., width 1.85 mm., allotype ♀, length 4.8 mm., width 2.4 mm.

Mean length of 10 ♂♂: 3.84 mm.; min. 3.65 mm., max. 4.35 mm.

Mean width of 10 ♂♂: 1.81 mm.; min. 1.65 mm., max. 2.0 mm.

Mean length of 10 ♀♀: 4.20 mm.; min. 3.9 mm., max. 4.8 mm.

Mean width of 10 ♀♀: 2.18 mm.; min. 1.9 mm., max. 2.4 mm.

Material: Holotype, male, (R. L. Usinger Collection), Calif., Colusa Co., Wilbur Spr., Aug. 16, 1960, R. L. Usinger collector; allotype, female, same locality but May 17, 1961, Wygodzinsky collector;

paratypes as follows: 9 ♂♂, 8 ♀♀, same data as holotype; 3 ♂♂, 4 ♀♀, 2 nymphs, same but May 17, 1961, Wygodzinsky collector; 1 ♂, 6 ♀♀, same but Sulphur Cr. at Wilbur Hot Spgs., Mar. 29, 1956, on shore in 'Footbath' pool area, H. B. Leech collector; 1 ♀, same as holotype but May 15, 1967, N. Ueshima collector; 3 ♂♂, 1 ♀, same as holotype but H. C. Chapman collector.

Paratypes are in the collections of P. Wygodzinsky, R. L. Usinger, H. C. Chapman, J. T. Polhemus, and USNM. I am indebted to Drs. Wygodzinsky, Usinger and Chapman for the opportunity to study this material, and to the latter for helping in the diagnosis of this material. This species is named in honor of Dr. R. L. Usinger in recognition of his interest in and fine contributions to our knowledge of Saldidae.

Comparative notes: *Saldula usingeri* n. sp. is close to *Saldula pilosella* (Thomson) of Europe. Both of these species have small eyes and a wide interocular space, the latter often exceeding the width of an eye in both species. In *usingeri*, however the front lobe of the pronotum is long compared to the posterior lobe (measured on a median line, not including the collar), the ratio for *usingeri* being anterior: posterior, 17.7: 10.8 (10 specimens) and for *pilosella* 12.9: 10.9 (10 specimens). In addition the pilosity of the paramere is much heavier in *usingeri* (fig. 1) and the paramere is of a different shape. The color of the specimens of the two species is quite different in the material examined, *pilosella* being much lighter.

Cobben (1958) considers *Saldula hirsuta* (Reuter) a subspecies of *S. pilosella*. Material of *hirsuta* has not been examined, but as Cobben gives only the relative hairiness as the difference between the two forms of *pilosella*, it is clear that we are dealing with a different species in *usingeri*.

Considering North American species, *usingeri* is closest to *Saldula pexa* Drake, however the parameres, parandria and eunomy are different. The clavus always has a well defined apical spot in *pexa*, and never in *usingeri*, however in the lightest specimens of the latter there is a small, ill-defined light area. The most distinctive character of *usingeri*, however, is the wide interocular space due to the small eyes, particularly noticeable in large females where the head looks disproportionately small.

Drake (1950) lists *Saldula hirsuta* (Reuter) as occurring in California, but almost certainly he was referring to either *usingeri* or *pexa*.

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ECTOPARASITES OF CANADIAN BIRDS AND MAMMALS[1]

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A small collection of ectoparasites from birds and mammals is listed with comments relative to host relationships and distribution in Canada. Important past references to each species in Canada are reviewed briefly. Eighteen species belonging to 7 orders are listed from 13 species of birds and mammals. Eight of these are new Canadian, provincial and/or host records.

Specimens have been distributed between Joseph Moore Museum, Earlham College, Richmond, Indiana and Bernice P. Bishop Museum. Thanks are extended to Mr. W. W. Baker, Dr. R. E. Mumford and Mrs. G. L. Ward for providing most of the material for study.

List of Ectoparasites

Class ACARINA

Order METASTIGMATA

Family IXODIDAE

Haemaphysalis leporispalustris (Packard)

1 ♂, 1 ♀, ex *Lepus americanus* Erxleben, New Brunswick, Charlotte Co., Kent I., 25.VII.1963, I. L. Brisbin (FN 29).

This is the tick encountered most often on leporids in North America. Gregson (1956) tabulated many records from Canada including four from New Brunswick.

Ixodes angustus Neumann

1 ♀, ex *Tamias striatus* (Linnaeus), Ontario, Thessalon, 64 km N, 26.VII.1965, J. B. Cope (JBC 581).

According to Gregson (1956) this species is best known from the western provinces but is found throughout Canada. He listed it from this host in Ontario.

Order MESOSTIGMATA

Family HAEMOGAMASIDAE

Eulaelaps stabularis (Koch)

1 ♀, ex *Sorex cinereus* Kerr, Saskatchewan, Regina, 3 km SE, 28.VIII.1959, N. Wilson (E 1156); 1 ♀, ex *Microtus pennsylvanicus* (Ord), Saskatchewan, Regina, 3 km SE, 28.VIII.1959, N. Wilson (E 1157).

E. stabularis is a widespread species recorded mostly from rodents and insectivores. This is the first record from Saskatchewan and from S. *cinereus*. All previous Canadian records are from Ontario (Banks, 1909; Jameson, 1950; Judd, 1950).

Haemogamasus ambulans (Thorell)

1 ♀, ex *Eutamias minimus* (Bachman), Ontario, Chapleau, 32 km E, VII.1965, W. H. Buskirk and J. B. Cope.

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[1] This investigation was supported in part by Public Health Service Research Grant AI-01723 from the National Institutes of Allergy and Infectious Disease, National Institutes of Health, Public Health Service.

This species is known from the northern United States, Canada and Alaska under the name *Haemogamasus alaskensis* Ewing. Rodents and insectivores are the common hosts. It never has been reported from *E. minimus* but there are records from Ontario (Jameson, 1950; Keegan, 1951). The record of *Haemogamasus hirsutus* Berlese from Ontario by Judd (1950) may be this species.

Family LAELAPIDAE

Androlaelaps fahrenholzi (Berlese)

1 N, ex *Microtus pennsylvanicus,* Saskatchewan, Regina, 3 km SE, 28.VIII.1959, N. Wilson (E 1157).

This is a widespread species occurring most frequently on rodents. It has been recorded from Canada by Strandtmann (1949), Jameson (1950), Judd (1950, 1953) and Scholten et al. (1962), but never from Saskatchewan.

Laelaps alaskensis Grant

3 ♀♀, ex *Microtus pennsylvanicus,* Ontario, Attawapiskat, 7.VII.1965, J. B. Cope et al. (JBC 550).

This rodent mite has been reported from Keewatin and Ellef Ringnes Island in Canada (Harper, 1956; McAlpine, 1964; 1965). Records of *Laelaps muris* (Ljungh) from Ontario by Judd (1950; 1953; 1954) are probably this species.

Order PROSTIGMATA

Family TROMBICULIDAE

Ensehongastia sp.

40 LL, ex *Microtus pennsylvanicus,* Saskatchewan, Regina, 3 km SE, 27.VIII. 1959, N. Wilson (E 1155).

All specimens lack sensillae making specific identification impossible. They are very close to *E. campi* Brown and Brennan and *E. sciuricola* (Ewing) both of which have been collected in Canada (Brown and Brennan, 1952; Farrell, 1956).

Class INSECTA

Order ANOPLURA

Family HOPLOPLEURIDAE

Hoplopleura acanthopus (Burmeister)

1 ♂, 2 ♀♀, ex *Microtus pennsylvanicus,* Saskatchewan, Regina, 3 km SE, 28.VIII.1959, N. Wilson (E 1157).

H. acanthopus is a common ectoparasite of *Microtus* in North America and has been reported previously from Canada (Ferris, 1921; Harper, 1956; Scholten et al., 1962; McAlpine, 1964, 1965; Spencer, 1966).

Order MALLOPHAGA

Family MENOPONIDAE

Myrsidea anaspila (Nitzsch)

2 ♀♀, ex *Corvus corax* Linnaeus, Ontario, Moosonee, 28.VI.1965, J. B. Cope; 2 ♀♀, 1 N, ex *C. corax,* Ontario, Moosonee, 15.VII.1965, J. B. Cope and W. H. Buskirk.

Neither Spencer (1948, 1957), Stirrett (1952) nor Whitehead (1954) listed this species from Canada; however, it is to be expected on the common raven.

Trinoton querquedulae (Linnaeus)

1 ♂, ex *Anas carolinensis* Gmelin, Manitoba, Delta, 13.VIII.1964, D. A. Manuwal.

This mallophagan occurs on several species of ducks and has been collected from this locality on this host (Buscher, 1965). There are other Canadian records from British Columbia (Spencer, 1948), Ontario (Stirrett, 1952) and Quebec (Whitehead, 1954).

Family PHILOPTERIDAE

Saemundssonia sternae (Linnaeus)

1 ♀, ex *Sterna hirundo* Linnaeus, Manitoba, Delta, 13.VIII.1964, D. A. Manuwal (REM 4501).

This species is expected to occur wherever the common tern does, although apparently it has not been collected in Canada.

Order SIPHONAPTERA

Family CERATOPHYLLIDAE

Megabothris atrox (Jordan)

4 ♀♀, ex *Mustela erminea* Linnaeus, Ontario, Moosonee, 14.VII.1965, W. H. Buskirk (B).

Holland (1949) mentioned only two records of this species; that of Jordan's from Alberta and a new one from Northwest Territories. The above record extends the range about 2,300 km eastward in Canada. The few collections indicate this flea is a parasite of weasels.

Three of four specimens varied from the original description in that they had fewer pronotal spines (23, 23, 24, 26). Jordan (1925) indicated there were 26 to 29 spines in the pronotal ctenidium of his specimens which suggested to him that it might be a bird flea.

Megabothris quirini (Rothschild)

2 ♂♂, 1 ♀, ex *Mustela erminea,* Ontario, Moosonee, 14.VII.1965, W. H. Buskirk (A); 1 ♂, ex *M. erminea,* Ontario, Moosonee, 14.VII.1965, W. H. Buskirk (B).

This flea is normally a parasite of cricetid rodents and the present records may reflect predation by weasels on these rodents. This is a widespread species in Canada and Holland (1949) listed several records from Ontario.

Monopsyllus eumolpi eumolpi (Rothschild)

1 ♂, ex *Eutamias minimus,* Ontario, Chapleau, 32 km E, VII.1965, W. H. Buskirk and J. B. Cope.

This chipmunk flea probably occurs throughout the range of *Eutamias* in Canada. Holland (1949) and Hubbard (1949) each reported three records from Ontario.

Monopsyllus vison (Baker)

1 ♂, ex crawling on *Homo sapiens* Linnaeus, Ontario, Moosonee, 12.VII.1965, W. H. Buskirk. 2 ♂♂, ex *Mustela erminea,* Ontario, Moosonee, 14.VII.1965, W. H. Buskirk (B).

This species is widespread in Canada with *Tamiasciurus hudsonicus* (Erxleben) the true host. The specimen from man probably was acquired while handling

mammals and those from a weasel reflect the predatory nature of this animal. Holland (1949), Hubbard (1949) and Scholten et al. (1962) listed several records from southern Ontario.

Orchopeas caedens durus (Jordan)

2 ♂♂, 2 ♀♀, ex *Mustela erminea*, Ontario, Moosonee, 14.VII.1965, W. H. Buskirk (B).

The subspecies *durus* has a widespread but discontinuous distribution in Canada. Its true host is *T. hudsonicus* and the above record probably indicates predation by the weasel on red squirrels. There are several records of this species from Ontario (Holland, 1949; Judd, 1954; Scholten et al., 1962).

Family Ischnopsyllidae

Myodopsylla insignis (Rothschild)

1♂, 1 ♀, ex *Myotis lucifugus* (Le Conte), New Brunswick, Charlotte Co., Kent I., 17.VIII.1963, I. L. Brisbin (FN 54).

M. insignis is widely distributed in Canada from inland British Columbia to New Brunswick, from which latter province the above record is the first. Bats of the genus *Myotis*, especially *M. lucifugus*, are recorded most frequently as hosts.

Order Diptera

Family Hippoboscidae

Ornithomya fringillina Curtis

1 ♂, ex *Zonotrichia albicollis* (Gmelin), Ontario, Moosonee, 15.VII.1965, J. B. Cope and W. H. Buskirk; 1 ♀, ex *Passerella iliaca* (Merrem), Ontario, Moosonee, 16.VII.1965, J. B. Cope; 1 ♂, ex clothing, Ontario, Moosonee, 17.VII.1965, W. H. Buskirk; 1 ♀, ex Z. *albicollis*, Ontario, Moosonee, 21.VII.1965, J. B. Cope.

This is a common hippoboscid of certain species of passeriform birds in temperate North America and there are numerous records from Canada, including Ontario, (Bequaert, 1954; Davies, 1958; Bennett, 1961). The fox sparrow apparently is not one of the preferred hosts as Bequaert (1954) published only one verified record.

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A NEW SPECIES OF OMANIA FROM MICRONESIA
(HEMIPTERA: SALDIDAE)

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The following new species is the first member of the genus *Omania* Horváth from Micronesia. Previously, four species were known: *coleoptratra* Horváth, 1915 from the Sultanate of Oman and the Sinai Peninsula, *marksae* Woodward, 1958 from intertidal coral rocks of the Great Barrier Reef of Australia, *samoensis* Kellen, 1960 from American Samoa and *satoi* Miyamoto, 1963 from the Tokara Islands south of Kyushu, Japan. The present species was collected at Nauru Island in southeastern Micronesia.

All of the members of the genus are extremely small and secretive and have thus far eluded discovery on most of the islands of Oceania. Both Woodward (1958) and Kellen (1960) have given excellent accounts of the life history, habits and adaptations of these saldids to a marine life in the intertidal zone. Drake (1961) has summarized the literature and included a splendid illustration of *O. marksae*.

KEY TO THE SPECIES OF **Omania** HORVÁTH

1. Eyes small, width two-thirds or less the width of the vertex at level of ocelli, length subequal to length of pronotum; vertex with silvery pubescence; hemelytra almost unicolorous 2
   Eyes large, width four-fifths or more the width of the vertex at level of ocelli, length greater than length of pronotum; vertex with golden pubescence; hemelytra with a contrasting pattern of bluish bloom and black .. 4
2. Collum of head distinctly triangular; all antennal segments concolorous light brown; calluses of pronotum flat, poorly delimited; pronotum, scutellum, and hemelytra uniformly bluish gray; legs light brown .. **coleoptrata** Horváth
   Collum of head not triangular, anterior demarcation arcuate; antennal segments III and IV dark brown or black; calluses of pronotum slightly raised and clearly demarcated; pronotum, scutellum and hemelytra velvety black 3
3. Antennal segment III only one-half as long as IV, apices of segment I and II fuscus, all of III and IV black; posterior lobe of pronotum about twice as long as the anterior collar; hemelytra uniformly dull black .... **satoi** Miyamoto
   Antennal segment III approximately two-thirds as long as IV, apex of segment II and all of III and IV brownish black; posterior lobe of the pronotum only slightly longer than anterior collar; hemelytra marked with a bluish bloom along costal margin and near middle of disk ..... **marksae** Woodward
4. Length of eye almost one and a half times length of pronotum, its posterior margin extending beyond the posterior margin of the pronotal collar;

[1] Washington, D. C. and Lake Charles, Louisiana, respectively.

median fovea of callus deep, almost completely separating callus into two swollen lobes; scutellum very small, distinctly less than twice as wide as long; irregular silvery blue pattern occurring extensively over pronotum, scutellum and hemelytra ..... **nauruensis**, n. sp.

Length of eye no more than one and a quarter times length of pronotum, its posterior margin not surpassing the posterior margin of the pronotal collar; median fovea of callus distinct but not dividing the callus into two separate lobes; scutellum twice as wide as long; irregular silvery blue pattern confined to sides of pronotum and three stripes on hemelytra ..... **samoensis** Kellen

Omania nauruensis, n. sp.
(Figs. 1–2)

Male.—Head in front vertical, strongly deflexed, not projecting in front of eyes; over twice as wide as long, 40: 17[2]. Eyes large, four-fifths the width of vertex at level of ocelli; almost one and a half times length of pronotum on median line, 23: 16, their hind margins surpassing the hind margin of the pronotal collar; vertex, frons and clypeus shining black, finely rugulose; pubescence fine, golden. Ocelli raised, separated from each other by twice the distance between ocellus and eye. Anterior pair of cephalic trichobothria large, closely resembling ocelli but pale, bearing the usual pair of long, black setae. Posterior hairless collum on median line one-fourth total length of head, 4:17, with dull blue-gray pruinosity; anterior margin broadly arcuate. Clypeal region and underside of head with long, pale hairs. Rostrum testaceous, reaching middle coxae. Relative lengths of antennal segments I–IV, 9: 13: 11: 16, with numerous hairs; segments I and II pale, III and IV uniformly reddish brown.

Pronotum hardly more than one-half as long as wide at base, 16: 33; lateral margins rounded and evenly tapered to anterior collar; posterolateral angles bluntly angled but not carinate or explanate; collar about one-sixth of total length, 2.5: 16; callus prominently elevated and clearly demarcated by a sulcus at sides and behind, median fovea continued as a sulcus which almost completely divides callus into two lobes; pronotal margins and median sulcus with blue-gray pruinosity.

Scutellum small, over one and a half times wider than long, 16: 10; one-half as wide as base of pronotum, 16: 33; disk depressed on sides leaving a longitudinal carina joined to the transverse basal one, clearly defined by the blue-gray pruinosity.

Forewings completely covering sides of abdomen and extending to level of sterna; dark, entirely coriaceous, elytron-like; not over-lapping and without a trace of membrane; costal margins broadly convex, apices rounded; surpassing abdomen, slightly diverging. Claval suture present, weakening apically, but clearly defined by preapical pruinose band. Blue-gray pruinose areas as follows: a large basal and preapical band on clavus, an irregular patch on base of corium extending narrowly down the lateral margin of hemelytra, widening at middle third and extending inward almost to commissure, a broad band at apical margin. Hind wings absent.

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[2] 73.5 units = 1 mm.

Fig. 1, *Omania nauruensis,* n. sp., holotype ♂.

Pronotum, scutellum and hemelytra impunctate, with rather sparse covering of short, curved hairs, these becoming longer laterally.

Coxae and most of femora shining testaceous; apical fifth or sixth of each femur, all tibiae, tarsi stramineous with abundant long hairs; tibiae with some stiff spines.

Genital capsule small with a pair of minute claspers (fig. 2).

Total length 1.20 mm., greatest width of hemelytra 0.57 mm.

Female very similar to male but larger. Length 1.36 mm., greatest width of hemelytra 0.68 mm.

Fig. 2, ♂ clasper.

Holotype male (USNM 69554) and allotype female, Nauru Island, 432 miles west of the Gilbert Islands and just south of the equator, Nov. 25, 1966; 137 paratypes, same locality but Nov. 16, 19, and 25, 1966. All collected by H. C. Chapman.

Holotype, allotype and 35 paratypes in the USNM. Paratypes in John T. Polhemus collection and H. C. Chapman collection.

O. nauruensis can be distinguished from the other four members of the genus by its large, elongate eyes and the distinctive and apparently constant color pattern.

Collecting Notes

Omania nauruensis was collected at low tide from coral pinnacles that were common in the reef which completely surrounds Nauru Island. Most collections were made in the vicinity of Anibare Bay. The coral outcroppings varied in size from a foot to more than eight feet in height and many were very broad (fig. 3). Fig. 4 shows a coral pinnacle which generally produced specimens of this saldid. Specimens were collected by flushing or splashing water against the coral out-croppings just above the water where the surface was still moist from the previous high tide. The specimens were washed into the water where they were easily collected by a dipper or finger tip and then placed in a vial of alcohol. Because of the small size of this species, their collecting was facilitated by splashing pinnacles which were in the open sunlight and had white sand at their bases. Specimens appeared rather helpless in the water; if they were not collected, they eventually returned to a pinnacle. *O. nauruensis* apparently comes out of the interstices of the coral outcroppings at definite times during low tides. Collecting of this species was rather poor immediately following low tides.

Fig. 3, Anibare Bay at low tide showing coral pinnacles.

Fig. 4, Coral pinnacle which often produced *Omania nauruensis*.

Halovelia marianarum Usinger was the only other aquatic bug noted in the general habitat. This marine veliid was often seen around and on portions of the coral pinnacles.

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THE NEARCTIC DORYCTINAE, V. THE GENUS LELUTHIA AND COMMENTS ON THE STATUS OF THE TRIBE HECABOLINI

(Hymenoptera, Braconidae)

Paul M. Marsh, *Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D. C. 20560*

The Doryctinae have been divided into two tribes depending upon the presence of the second intercubitus in the forewing and, hence, three cubital cells (Doryctini), or the absence of the second intercubitus, hence, two cubital cells (Hecabolini). Tobias (1961) described a genus and species of Doryctinae which usually had two cubital cells but in which several specimens had three. After further study, and when he found no other characters to distinguish the Hecabolini and Doryctini, he concluded that "the presence or absence of the second intercubitus can not serve as a reliable criterion for the separation of these groups."

During my study of the genus *Leluthia* Cameron which normally has three cubital cells, I observed one distinct species and several specimens of another with only two cubital cells. Furthermore, one specimen has the right wing with two cells and the left with three. Otherwise, the specimens are identical and, I believe, congeneric. I agree with Tobias that this character of the forewing is not reliable

for tribal separation and that, therefore, the two tribes should be combined.

Leluthia Cameron

Leluthia Cameron, 1887, p. 392. Type-species: *Leluthia mexicana* Cameron. Desig. by Viereck, 1914.

Russellia Muesebeck, 1950, p. 78. Preocc. by Vargas, 1943. Type-species: *Heterospilus* (?) *astigma* Ashmead. Orig. desig. **New synonymy.**

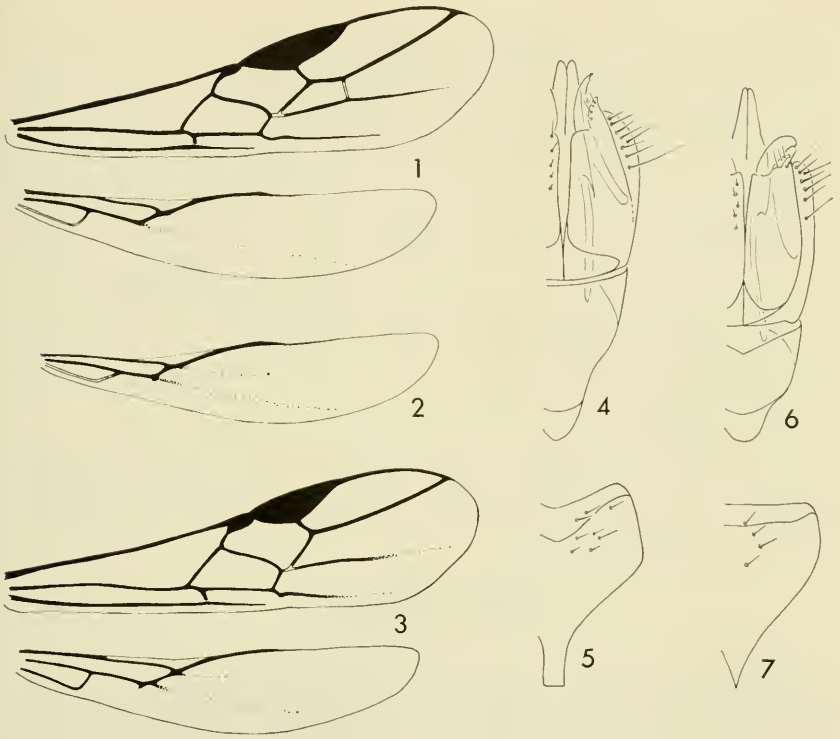
Russellella Muesebeck and Walkley, 1951, p. 178. New name for *Russellia* Muesebeck.

Distinguished by the following characters: head subcubical; first flagellar segment longer than second; forewings with two or three cubital cells, radial cell short, usually not nearly attaining apex of wing, recurrent vein entering first cubital cell, sometimes at extreme apex, subdiscoideus nearly on a straight line with discoideus, first brachial cell open at apex; foretibia with row of 5–10 small stout spines; tergum (2+3) with a tranverse strongly bisinuate groove and short shallow oblique grooves from base of tergum which set off a circular or oval area medially at base of tergum (fig. 10).

Cameron (1887) included two species in *Leluthia, mexicana* and *fuscinervis,* the types of which are in the British Museum. Subsequently Viereck (1914) designated *mexicana* as the type-species of the genus. The other species, *fuscinervis,* is not congeneric with *mexicana* and, in fact, belongs to the genus *Heterospilus.* Muesebeck (1950) described the genus *Russellia* to include his species *prosopidis* and *astigma* Ashmead. These species are definitely congeneric with *Leluthia,* and *prosopidis* is identical with the type-species, *mexicana.*

KEY TO NEARCTIC SPECIES OF **Leluthia**

1. Females 2
   Males 5
2. Second intercubitus absent, forewing with two cubital cells 3
   Second intercubitus present, forewing with three cells 4
3. Ovipositor as long as abdomen; hindfemur about four times longer than its greatest width ..... *floridensis,* n. sp.
   Ovipositor shorter than abdomen; hindfemur about three times longer than greatest width ..... *astigma* (Ashmead)
4. Vertex transversly rugosopunctate; thorax stout, slightly longer than high ..... *mexicana* Cameron
   Vertex punctate or granular; thorax flattened dorsoventrally, usually about twice as long as high ..... *astigma* (Ashmead)
5. Stigma present in hindwing (fig. 8); if rarely absent, then vertex transversely rugosopunctate ..... *mexicana* Cameron
   Stigma absent in hindwing; vertex punctate or granular 6
6. Second intercubitus absent, forewing with two cubital cells; hindfemur about four times longer than its greatest width ..... *floridensis,* n. sp.
   Second intercubitus present; if rarely absent, then hindfemur about three times longer than greatest width ..... *astigma* (Ashmead)



Figs. 1–3. Wings of *Leluthia* species: fig. 1, *astigma*, ♀, fore and hindwing; fig. 2, *astigma*, ♂, hindwing; fig. 3, *floridensis*, ♀, fore and hindwing. Figs. 4–7. Male genitalia: fig. 4, *astigma*, genital capsule; fig. 5, *astigma*, ninth sternum; fig. 6, *floridensis*, genital capsule; fig. 7, *floridensis*, ninth sternum.

Leluthia astigma (Ashmead), n. comb.
(Figs. 1, 2, 4, 5)

Heterospilus (?) *astigma* Ashmead, 1896, p. 215. Holotype male, USNM 69555.
Russellia astigma (Ashmead), Muesebeck, 1950, p. 78.
Russellella astigma (Ashmead), Muesebeck and Walkley, 1951, p. 178.

Female.—Length of body, 3–6 mm, ovipositor, 1–2 mm. Color usually entirely dark brown or black with legs lighter; often legs and basal antennal segments bright honey yellow, and body marked with reddish brown. Head cubical, flattened dorsoventrally; entirely finely granular or punctate, lower part of temples occasionally smooth; malar space one-third eye height; temples about one-half eye width; antennae 25–32 segmented. Thorax flattened dorsoventrally, often very much so; pronotum short, somewhat swollen; propleuron granular; propleural groove distinct, weakly foveolate; mesonotum not sharply declivous anteriorly; mesonotal lobes finely granular; notauli weak, rugose, obscured behind by wide rugose area; scutellar furrow with 7 cross carinae; scutellar disc granular; mesopleural disc and mesosternum granular; mesopleural furrow usually smooth;

subalar groove shallow, often rugose; propodeum coarsely granular, often longitudinally rugosopunctate medially. Hindcoxae and all femora granular; hindfemora about three times longer than greatest width. Wing venation as in fig. 1; stigma usually about four times as long as wide; second intercubitus occasionally absent. First abdominal tergum longer than wide, longitudinally rugosopunctate; tergum (2+3) with area in front of transverse groove short and broad, more often oval than circular; remainder of terga granular; ovipositor about two-thirds abdominal length.

Male.—Essentially as in female; hindwing without stigma (fig. 2); genitalia as in fig. 4, ninth sternum narrowed and truncate anteriorly (fig. 5).

Type Locality.—Morgantown, West Virginia.

Distribution.—Arizona, California, Iowa, Maryland, North Carolina, Ohio, Oklahoma, Pennsylvania, Quebec, Texas, Utah, Virginia, West Virginia, Wyoming; Mexico.

Hosts.—*Agrilus* sp., *A. difficilis* Gory, (?) *A. politus* (Say).

The specimens from Oklahoma, Texas, California, and Mexico are generally flatter and lighter than the other more northern specimens. However, I can find no significant differences and feel that they are members of this species.

Leluthia floridensis, n. sp.

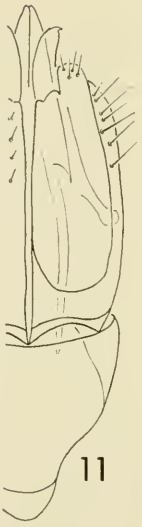
(Figs. 3, 6, 7)

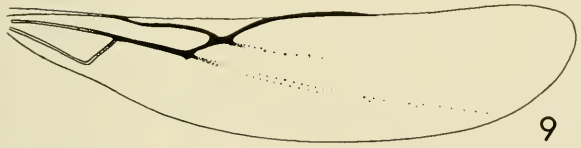
Female.—Length of body, 4–5 mm, ovipositor, 2–2.5 mm. Head, thorax, and first abdominal tergum, and tergum (2+3) medially at base, dark brown, often black; legs and remainder of abdomen brown. Head flattened dorsoventrally; eyes large; malar space about one-fourth eye height; temples about one-half eye width; vertex flat, not declivous posteriorly, transversely rugulopunctate; face, temples, and frons punctate; antennae 26–29 segmented. Thorax flattened dorsoventrally; prothorax punctate; propleural groove shallow, rugulose; mesonotal lobes punctate; notauli shallow, weakly foveolate; obscured behind by wide rugose area; scutellar furrow narrow, with 7 cross carinae; scutellar disc flat, punctate; mesopleural disc and mesosternum punctate; mesopleural furrow shallow, weakly foveolate, usually as long as mesopleuron; subalar groove shallow, wide, rugose; propodeum nearly horizontal, completely longitudinally rugose. Legs punctate; hindfemora usually about four times longer than wide. Wing venation as in fig. 3; second intercubitus always absent; radial cell somewhat longer than in other species but not reaching wing tip. First abdominal tergum about as long as apical width, longitudinally rugose, without a raised median area; tergum (2+3) granular behind transverse sinuate groove; remainder of abdominal terga granular; ovipositor equal to length of abdomen.

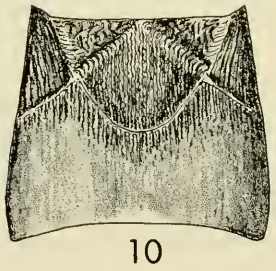
Male.—Similar to female; length 3–4 mm; genitalia as in fig. 6; ninth sternum pointed anteriorly (fig. 7); hindwing without stigma.

Holotype female.—Florida: Polk County, August 31, 1961, ex citrus limbs. USNM 69553.

Paratypes.—Florida: Polk County, 6 ♀♀, 3 ♂♂, August 28 and September 5, 1961, ex citrus limbs; Lake Alfred, 1 ♀, August 21, 1961.







Figs. 8–12. *Leluthia mexicana*: fig. 8, fore and hindwings, ♂; fig. 9, hindwing, ♀; fig. 10, tergum (2+3); fig. 11, genital capsule, ♂; fig. 12, ninth sternum, ♂.

Host.—One specimen was reared from citrus limbs infested with the weevil *Cryptorhynchus fallax* LeConte.

This species is so similar morphologically and in general habitus to the type-species, *mexicana*, that I feel it undoubtedly belongs in *Leluthia*. The presence of only two cubital cells in the forewing would have placed this species in the tribe Hecabolini; but, in the light of the brief discussion above, this tribe has no validity. Although the male genitalia of *floridensis* are somewhat different, I do not think that this is enough to warrant a separate generic placement.

Leluthia mexicana Cameron
(Figs. 8–12)

Leluthia mexicana Cameron, 1887, p. 392. Holotype female in the British Museum.
Russellia prosopidis Muesebeck, 1950, p. 78. Holotype female, USNM 59483.
New synonymy.
Russellella prosopidis (Muesebeck), Muesebeck and Walkley, 1951, p. 178.

Female.—Length of body, 3–6 mm, ovipositor, 1.5–3.5 mm. Color dark brown or black except lower part of head, prosternum, and legs which are often lighter brown. Head subcubical; vertex and frons transversely rugosopunctate, face rugulose, temples granular; malar space about one-third eye height; temples about three-fifths eye width; antennae 22–30 segmented. Thorax stout, not flattened; pronotum short, propleuron rugose; propleural groove not distinct; mesonotum declivous anteriorly; mesonotal lobes granular; notauli represented by wide shallow rugose lines, obscured posteriorly by wide rugose area; scutellar furrow with 7 cross carinae; scutellar disc granular; mesopleural disc punctate; mesopleural furrow deep, finely foveolate; subalar groove broad and strongly rugose; mesosternum punctate; propodeum completely rugose, no indication of carinae. Hindcoxae and all femora granular. Forewing venation as in fig. 8; hindwing, fig. 9; stigma of forewing about three times as long as wide; second segment of radius short, sometimes much shorter than first segment. First abdominal tergum about as long as broad at apex, longitudinally rugose, without raised median area; tergum (2+3) finely rugosopunctate behind transverse groove (fig. 10); remainder of terga granular; ovipositor about as long as abdomen.

Male.—Essentially as in female; length 2.5–4.5 mm; hindwing with a stigma, (fig. 8), rarely without one; genitalia as in fig. 11; ninth sternum narrowed and truncate (fig. 12).

Type Locality.—Northern Sonora, Mexico.

Distribution.—Arizona, California, New Mexico, Oklahoma, Texas; Mexico.

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OBSERVATIONS ON ORIBATEI. THE DISCOVERY OF HAPLOCHTHONIUS SIMPLEX (WILLMANN) IN NORTH AMERICA

(ACARI: ACARIFORMES)[1]

Haplochthonius simplex (Willmann, 1930) is a small, presumed primitive, oribatid mite of the enarthronote family Haplochthoniidae. The species is of interest to students of comparative morphology of Acariformes because of (1) a presumed primitive notogastral chaetotaxy; (2) the absence of notogastral scissures in the immature stases; (3) the presence of 5 pairs of centrodorsal notogastral lyrifissures; (4) the hypertrophy of the postlabral apodeme; and (5) the presence of 2 pairs of genital gland ducts emptying into the genital vestibule.

Haplochthonius simplex was originally described from a single specimen found in leaf litter in Holland. The species was redescribed in magnificent detail by Grandjean in 1947 (Ann. Sc. Nat. Zool., Paris, 11e Ser., VIII:213–248) and it is this redescription on which my determination of the specimens mentioned below is based. Grandjean collected *H. simplex* in several countries in the Mediterranean region from extremely dry litter and, at Periguex, inside his house. He characterized *H. simplex* as a xerophilous species and suggested that its occasional appearance, in small numbers, in Berlese extracts of mosses and moist litter materials may be due to contamination of the sample after it was brought into the laboratory. Willmann (1952; Zeitschr. f. Parasitenk. 15:392–428) recorded a single specimen of *H. simplex* from the pelage of a vole, *Microtus oeconomicus*, in Germany. The mite has apparently never been found outside of the Palaearctic region.

In a Berlese extract of some dry straw and debris from the roost of an English sparrow (*Passer domesticus*) one female and 2 tritonymphs of *Haplochthonius simplex* were found. The roost material was taken from my garage, 3 miles south of Wooster, Wayne Co., Ohio on 5 November 1964. A second collection made on 9 November from the same roost netted one protonymph, 2 deutonymphs, and one tritonymph. The number of mites taken is not impressive but does definitely establish the presence of this interesting mite in the new world. It seems doubtful that the mites can be regarded as laboratory contaminants of the samples as we have never before encountered *H. simplex* in our laboratory or in samples extracted there.

Other mite inhabitants of the roost were *Aeroglyphus robustus* (Banks), *Dermanyssus hirundinis* (Hermann), *Dermatophagoides* sp. immatures (the latter two associates of the English sparrow) and, in small numbers, miscellaneous Cheyletidae, Tarsonemidae, and erythracarine Anystidae.

In passing it may be mentioned that van der Hammen (1952; Zool. Verhandel., No. 17:22) reported that no specimen was present on the type slide of *H. simplex* in the Oudemans collection at the Rijksmuseum van Natuurlijke Historie, Leiden. During a brief visit to the Oudemans collection in September, 1962, I examined this type slide and can report that the specimen is indeed present in the preparation.—DONALD E. JOHNSTON, *Institute of Acarology, The Ohio State University, Columbus, Ohio 43210.*

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[1] Immediate publication secured by full payment of page charges—Editor.

AN ALATE APHID WITH AN EXTRA CORNICLE
(HOMOPTERA: APHIDIDAE)[1]

A single specimen of an alate aphid bearing an extra cornicle was found among approximately 300,000 aphids that were examined during 1960–66 in connection with a research project on aphid migration (NC-67). Entomologists in the central United States who cooperated in the project collected aphids in yellow-pan water traps, wind traps, and suction traps, and submitted the material to an identification center at the Department of Entomology, University of Wisconsin.

The abnormal specimen was a species of *Macrosiphum* taken in a suction trap at Lincoln, Nebraska, October 3, 1966. The extra cornicle arose from the right side of abdominal segment VI (fig. 1). The specimen had the tips of the cornicles and antennae broken off. As these bear diagnostic characters, specific identification was not possible.

Only once previously has this interesting and rare occurrence been reported in North America. Leonard described an extra pair of cornicles on apterae of *Aphis sambucifoliae* Fitch from Long Island, New York (Proc. Ent. Soc. Wash. 68: 320, 1966).

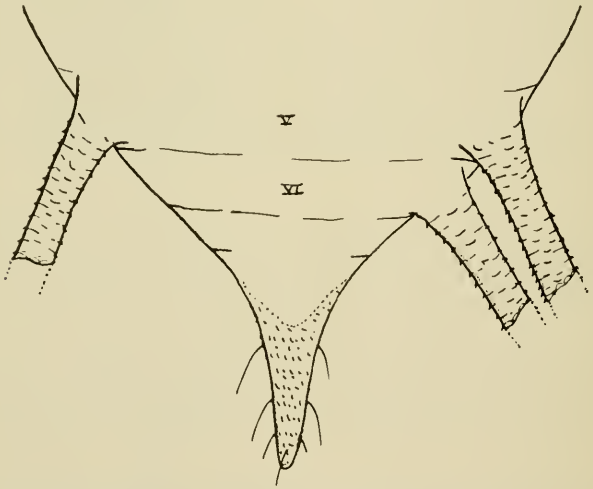

Fig. 1. Dorsal view of *Macrosiphum* sp., showing location of an extra cornicle on segment VI of the abdomen.

In Europe, extra cornicles have been reported on apterae of *Aphis* sp. near *esulae* Börner and *Megoura viciae* Kalt. (Remaudière, G., Rev. Path. Veg. et Entom. Agric. 43: 31–35, 1964).

This appears to be the first record of an extra cornicle either on an alate form or in the genus *Macrosiphum*.—J. T. MEDLER AND A. K. GHOSH, *University of Wisconsin, Madison.*

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[1] A contribution from the Wisconsin Agricultural Experiment Station, as a collaborator under North Central Regional Project NC-67, Migration of Aphids and Noctuids.

THE STATUS OF RATITIPHAGUS BATOCINA EICHLER
(MALLOPHAGA: MENOPONIDAE)

Eichler (1949, Boll. Soc. Ent. Ital. 79: 11–13) erected the new genus *Ratitiphagus* and included in it the single new species, *R. batocina*. The description was based only on the female, presumably taken from a specimen of *Pterocnemia pennata pennata* (d'Orbigny) (Order Rheiformes). Hopkins and Clay (1952, A Check List of the Genera & Species of Mallophaga, London, 362 pp.), in reference to this, stated: "There is no generic description and the description of the type-species is so grossly inadequate that we are unable to form a useful opinion as to whether the genus is good or not, especially as it is extremely probable that the occurrence . . . on the alleged host was due to contamination." They suggest, without availability of material for study, that *Ratitiphagus* is probably a synonym of *Colpocephalum*.

I have recently been able to borrow 2 paratype ♀♀ (WEC slides 1179q and 1179r) of *R. batocina* from the Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg; these specimens are from the type-host with collection data: Punta Arenas, Magalhaenstrasse [Chile], 23 April 1912. While they are not of optimal quality, they apparently possess no features significantly differing from those of ♀♀ of *Colpocephalum trispinum* Piaget as described by Price and Beer (1965, Ann. Ent. Soc. Amer. 58: 111–131). I see no reason, on the basis of available material, for not considering *R. batocina* a junior synonym of *C. trispinum*, whose type-host is a member of the Neotropical Ciconiiformes. This undoubtedly is an instance of contamination of the rheiform host, thus leading to the incorrect assumption by Eichler that he was dealing with a uniquely new louse from *P. pennata*.—ROGER D. PRICE, *Department of Entomology, Fisheries, and Wildlife, University of Minnesota, St. Paul, Minnesota 55101.*

PTILINUS FRIENDI, A NOMEN NUDUM
(COLEOPTERA: ANOBIIDAE)

The name *Ptilinus friendi* has appeared in print in Dissertation Abstracts in the abstract of John B. Simeone's thesis for the Ph.D. degree (1961, volume 21, number 7) and in the Canadian Entomologist (1961, volume 93, number 6, p. 428). In the first reference above the name is given as having been proposed in the thesis for a species described as new; in the second reference the name is cited as a synonym of *P. pectinicornis* (L.). Neither of these literature citations serve to validate the name. *Ptilinus friendi* has thus never been validly proposed and is not to be accepted into our nomenclature.—RICHARD E. WHITE, *Entomology Research Division, ARS, U. S. Department of Agriculture, Washington, D. C.*

THE BLOW FLIES OF DOMINICA[1]

(DIPTERA: CALLIPHORIDAE)

The blow flies of the Bredin-Archbold-Smithsonian survey of the island of Dominica consisted of only two species, both common and of wide distribution in tropical America. Though some variation was noticeable within the series, it was no more than could be noted in the same species in many areas on the American mainland.

Cochliomyia macellaria (Fabricius), the secondary screw-worm, was represented by 45 specimens from the following localities: Clarke Hall, 12 Oct. to 17 Nov., 1964, P. J. Spangler, 12 April, 1964, O. J. Flint, Jr., 8–13 Jan., 1965, malaise trap, W. W. Wirth, and 12 May and 6 June, 1966, human feces, G. Steyskal; Cabrit Swamp, 3 Nov., 1964, Spangler, and 23 Feb., 1965, Wirth; Fond Colet, 5–9 Oct., 1964, Spangler; S. Chiltern, 8–10 Nov., 1964, Spangler; Grand Bay, 13 April, 1964, Flint; and near Layou, 22 Jan., 1964, H. Robinson. The primary screw-worm, *C. hominivorax* (Coquerel), was not represented in the material; this species, however, is very rare in collections obtained other than through rearing.

Phaenicia eximia (Wiedemann), the common greenbottle fly of tropical America, was represented by 16 females and 2 males, the latter not in good condition. The parafacials vary in color, as they do in some series from the mainland, some being not as pale as the descriptions of this species would indicate. Localities represented were: Clarke Hall, 12 Oct. to 22 Nov., 1964, Spangler, 12 April, 1964, Flint, and 27 April, 1966, R. J. Gagné; Pont Casse, 12 & 23 Nov., 1964, Spangler; Cabrit Swamp, 3 Nov., 1964, Spangler; and Trafalgar Falls, 1200 ft., 5–6 April, 1966, Gagné.—MAURICE T. JAMES, *Department of Entomology, Washington State University, Pullman, Washington 99163.*

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[1] Scientific Paper 3031, College of Agriculture, Washington State University. Work conducted under Project 9043.

SOCIETY MEETINGS

743rd Regular Meeting—May 5, 1966

The 743rd meeting of the Society was called to order by the President, Miss Louise M. Russell, on May 5, 1966, at 8:00 p.m. in Room 43, U. S. National Museum. Twenty-eight members and sixteen guests were in attendance. Minutes of the previous meeting were approved as read.

Four new members were received into the society: *Jeffrey N. L. Stibick, Carl J. Mitchell, Botha DeMeillon,* and *John D. Lattin.* There was one candidate for membership, *Dale L. Jackson.*

Mr. Lou Davis reminded the Society of the annual dinner meeting held jointly with the Insecticide Society of Washington at the University of Maryland. Helen Sollers-Riedel announced that she had tickets for the dinner available for anyone interested.

M. D. Leonard presented an interesting resume of the various speculations and investigations concerning the biblical food "manna."

T. L. Bissell exhibited leaves from American Holly badly injured by a dipterous leaf miner. He also exhibited vol. 1, no. 1 of the recently established Journal of the Georgia Entomological Society.

Vic Adler announced the establishment of the Bussart Award sponsored by Velsicol Chemical Corporation in honor of the late J. Everett Bussart, distinguished entomologist and past president of the Entomological Society of America.

A recently collected Periodical Cicada was exhibited by David Gilsey.

Mr. Robert Kemp exhibited his entry in the Science Fair competition entitled "Ant reaction to light intensity." Following his demonstration, President Russell presented him with a book on insects as a small token of the Society's appreciation.

The speaker for the evening, Dr. Reinhold A. Rasmussen, Walter Reed Army Medical Center, gave an interesting illustrated talk on the relationships between bees, scent and orchid pollination.

Following the introduction of visitors, the meeting was adjourned at 9:35 p.m. —W. Donald Duckworth, *Recording Secretary.*

745th Regular Meeting—October 6, 1966

The 745th regular meeting of the Society was called to order by the president, Miss Louise M. Russell, on October 6, 1966, at 8:00 p.m. in room 43, U. S. National Museum. Thirty-seven members and twenty-five guests were in attendance. Minutes of the previous meeting were approved as read.

One new member was received into the Society—*Dale L. Jackson.* There were eight candidates for membership—*J. C. Lien, Thomas G. Floore, Joseph T. Koski, Clyde F. Smith, Linda Butler, D. F. Martin, D. G. Denning,* and *Robert W. Poole.*

President Russell announced the appointments to the following committees: Auditing Committee—J. E. Gilmore, J. A. Fluno, chairman, R. I. Sailer; Nominating Committee—P. A. Woke, chairman, B. A. App, J. M. Kingsolver.

T. J. Spilman spoke on the life of Frank A. McDermott, a specialist on the Lampyridae, who died on July 3, 1966. In addition, the second edition of the Lampyridae part of the Coleopterorum Catalogus Supplementa, written by Mr. McDermott, was reviewed.

Paul A. Woke noted the Anniversary meetings of the School of Public and Environmental Health.

Lou Davis presented greetings from Miriam A. "Ma" Palmer.

The program for the evening was an interesting illustrated symposium entitled "A Review of Egypt and its Entomology." Participants included R. H. Foote, moderator, R. W. Hodges, P. M. Marsh, G. C. Steyskal, and E. W. Baker.

After the Introduction of visitors, the meeting was adjourned at 10:00 p.m.—PAUL M. MARSH, *Acting Recording Secretary.*

746th Regular Meeting—November 3, 1966

The 746th regular meeting of the Society was called to order by the president, Miss Louise M. Russell, on November 3, 1966, at 8:00 p.m. in room 43, U. S. National Museum. Twenty-one members and ten guests were in attendance. Minutes of the previous meeting were approved as corrected.

Eight new members were received into the Society—*J. C. Lien, T. G. Floore, J. T. Koski, C. F. Smith, L. Butler, D. F. Martin, D. G. Denning,* and *R. W. Poole.* There were two candidates for membership—*Robert F. Whitcomb* and *Dan M. Harmon.*

Paul A. Woke, chairman of the nominating committee, presented the following proposed slate of officers for 1967: President, Louis G. Davis; President-elect, Richard H. Foote; Recording secretary, Ralph A. Bram; Corresponding secretary, David R. Smith; Treasurer, Arthur K. Burditt, Jr.; Editor, Jon L. Herring; Custodian, Robert Smiley; Program Committee Chairman, Victor E. Adler; Membership Committee Chairman, William B. Hull.

President Russell announced that the December meeting will be held on December 8th.

Mr. Bissell noted that *Thyridopterix ephemeroformis* was causing damage to junipers at the cornerstone of the Mason Dixon marker in the southwest corner of Delaware.

Dr. Hodges noted that volume one of Microlepidoptera Palaearctica was recently issued. It concerns the Crambinae and was written by S. Bleszynski.

The program for the evening was an interesting talk entitled Insects Versus Computers, presented by Dr. Judson U. McGuire, Biometrical Services Staff, USDA. A lively period of discussion followed Dr. McGuire's talk.

After the introduction of visitors, the meeting was adjourned at 9:30 p.m.—PAUL M. MARSH, *Acting Recording Secretary.*

748th Regular Meeting—January 5, 1967

The 748th regular meeting of the Society was called to order by the president, Mr. Louis G. Davis, on January 5, 1967, at 8:00 p.m. in room 43, U. S. National Museum. Thirty-two members and twelve guests were in attendance. Minutes of the previous meeting were approved as read. *Mr. C. John Lane* was received into the Society. President Davis announced committee appointments for 1967 as follows:

Membership Committee—William B. Hull (Elected Chairman), H. Ivan Rainwater, Ronald W. Hodges, D. H. Messersmith, A. S. Michel; Program Committee—Victor E. Adler (Elected Chairman); Publications Committee—Jon L. Herring (Elected Chairman), James P. Kramer, Paul M. Marsh, W. Donald Duckworth; Advertising Committee—James R. Foster, John M. Kingsolver; Finance Committee (established by the bylaws)—Arthur K. Burditt, Treasurer

(Chairman), Jon L. Herring, Editor, Robert Smiley, Custodian, Victor E. Adler, Program Chairman; Representative to the Washington Academy of Sciences—Harold H. Shepard.

President Davis announced the deaths of the following members during 1966: Dr. H. Ruckes, Dr. R. L. Webster, and Dr. G. Wolcott. Dr. Gurney added the name of Miss S. I. Parfin.

Mr. T. L. Bissell noted that in 1966 Dr. E. F. Knipling, a member of the Society, had received the Rockefeller Public Service Award and the National Medal of Science for his outstanding contributions to science.

Dr. B. D. Burks commented on investigations being carried out in Bolivia under British auspices on *Triatoma* vectors of Chagas disease.

Dr. A. B. Gurney exhibited the striking horned male of *Dynastes hercules* (L.) and a red-spotted evaniid, *Hyptia johnsoni* Ashmead, which were collected in the West Indies.

Dr. W. H. Anderson reported briefly on the successful introduction of a flea beetle, *Agasicles* sp., from Argentina to control alligator weed in the southeastern United States.

Miss Louise M. Russell presented the retiring president's address, a most interesting illustrated review of the present state of Aphidology. This was followed by a stimulating illustrated discussion of the tropical horse tick as a vector of equine piroplasmosis by Dr. D. W. Anthony.

Following the introduction of visitors, the meeting was adjourned by President Davis at 9:45 p.m.—RALPH A. BRAM, *Recording Secretary.*

749th Regular Meeting—February 2, 1967

In the absence of the President, the 749th regular meeting of the Society was called to order by the President-elect, Dr. Richard H. Foote, on February 2, 1967 at 8:00 p.m. in room 43, U. S. National Museum. Forty-six members and twenty-two guests were in attendance. Minutes of the previous meeting were approved as read. The names of *ENS J. Phillip Keathley,* MSC, USNR and *Mr. Gerald G. Elgert* were read for the first time as candidates for membership in the Society. Dr. Foote regretfully announced the death on February 1, 1967 of Mrs. T. E. Snyder, wife of our Honorary President.

C. W. Sabrosky exhibited an insect box which he had received from northern Nigeria and which was infested with the hyde beetle, *Dermestes maculatus* deGeer. G. G. Elgert exhibited a scarab beetle, *Polyphyla variolosa* Hertz, which he collected in a light trap on Assateague Island, Maryland as a new state record. V. E. Adler presented several current newspaper and magazine articles of entomological interest. A. B. Gurney exhibited a pair of *Dryococelus australis* (Montrouzier), a very large and unusual walkingstick from Lord Howe Island, east of Australia. It had been thought to be extinct, due to depredations of introduced rats; however, a recent note by McAlpine (Aust. Ent. Soc. News Bull. 2: 71–72, 1966) records its presence on Ball's Pyramid, a rocky island about 14 miles from Lord Howe. G. C. Steyskal reviewed and exhibited the book, "The Amazing World of Insects" by A. T. Bandsma and R. T. Brandt, published by the Macmillan Company in 1963. F. Smith exhibited a new book, "Insect Colonization and Mass Production," edited by C. N. Smith and published by the Academic Press.

The first speaker for the evening, Dr. W. Donald Duckworth, presented a most interesting illustrated discussion of "Entomology in the Tropics—New Emphasis

on an Old Subject." Dr. Duckworth's remarks concentrated on his experiences and knowledge of entomological programs in the New World tropics. The next speaker, Dr. Reece I. Sailer, reviewed the past and present research programs of the U. S. D. A. European Parasite Laboratory located outside of Paris, France. Dr. Sailer's informative, illustrated discussion included vignettes drawn from his five years experience as director of the laboratory.

Following the introduction of visitors, the meeting was adjourned by President-elect Foote at 10:10 p.m.—RALPH A. BRAM, *Recording Secretary.*

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PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

Information for Contributors

Publication (without charge) in the Proceedings is reserved for members only. However, immediate publication of papers by members (as well as non-members) may be obtained after acceptance at a cost to the author of $15.00 per printed page. Regular papers are published in approximately the order that they are received. Manuscripts should not exceed 30 typewritten pages including illustrations. Papers of less than a printed page may be published as space is available at the end of longer articles.

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> Muesebeck, C. F. W. 1963. Host relationships of the Euphorini (Hymenoptera: Braconidae). Proc. Ent. Soc. Wash. 65(4): 306.
>
> ———— and L. M. Walkley. 1951. *in* Muesebeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. Dept. Agr., Agr. Monogr. 2: 90–184.

In shorter articles, references to literature should be included in parentheses in the text.

Tables—Tables are expensive and should be kept to an absolute minimum. In most cases, material in tables can be incorporated into the text. When tables are necessary, each table should be prepared as a line drawing or typed on a separate page with heading at top and footnotes below. Number footnotes consecutively for each table. Use only horizontal rules.

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ENTOMOLOGICAL SOCIETY

OF

WASHINGTON

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of the

ENTOMOLOGICAL SOCIETY of WASHINGTON

U.S. NATIONAL MUSEUM
WASHINGTON, D.C. 20560

PUBLISHED QUARTERLY

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MEMBERSHIP.—Members shall be persons who have demonstrated interest in the science of entomology Annual dues for members are $5.00; initiation fee is $1.00 (U.S. currency).

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PROCEEDINGS OF THE

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Vol. 70 MARCH 1968 No. 1

A NEW SPECIES OF PIMELIAPHILUS FROM CALIFORNIA[1]

(ACARINA: PTERYGOSOMIDAE)

FREDERICK CUNLIFFE, *Walpole, New Hampshire*

Specimens of an undescribed species of *Pimeliaphilus* collected from *Trogaderma parabile* in California were sent to the U. S. Department of Agriculture in Washington in 1966 for determination. They are here described as new. For detailed studies on the genus see Newell and Ryckmann (1966).

Pimeliaphulus trogadermus, new species, is distinctive in having long dorsal body setae entirely barbed throughout, in that the short ventral body setae are entirely barbed, in lacking striae on the female dorsal shield, and in the shape of the dorsal shields of the male.

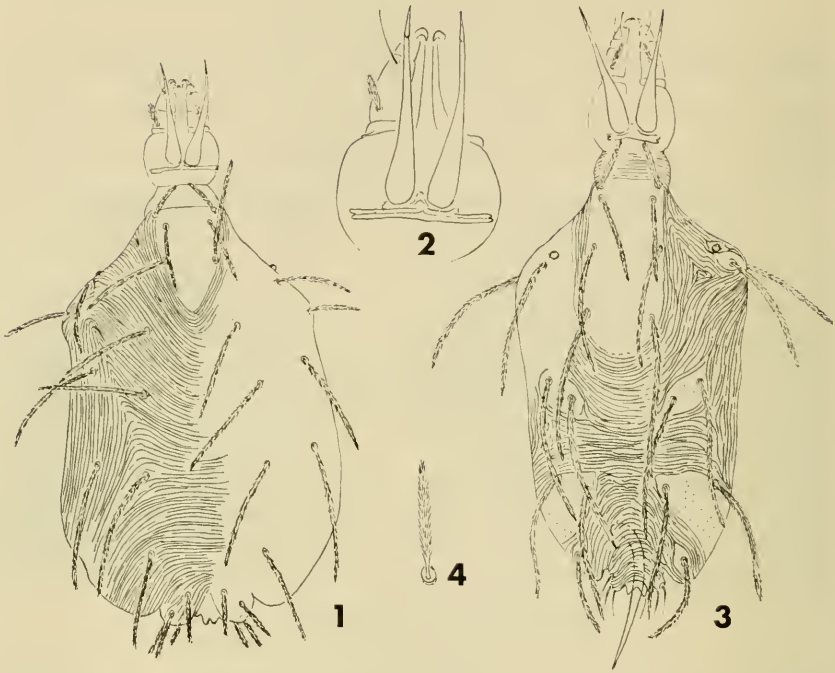
Pimeliaphilus trogadermus, n. sp.

(Figs. 1–10)

Female. Length of idiosoma 574 μ; length of gnathosoma 160 μ. Propodosomal shield 177μ long, broad anteriorly and narrowing posteriorly, 97 μ wide between 1st pair of setae, 81 μ between 2nd pair, and 77 μ between 3rd pair. First pair of shield setae 52 μ long, 2nd pair 97 μ long, 3rd pair 145 μ long; other dorsal body setae 150 μ long except for humerals which are 81 μ long; all dorsal body setae strongly barbed throughout entire length. Chelicerae 129 μ long; femoral setae of palps barbed and 32 μ long; femur and patella of palps not fused; ventral setae of gnathosoma sparsely barbed on basal half and tapering to point and located on level with insertions of palpi. Peritremes short and not reaching to margins of gnathosoma. Genital and anal setae much shorter than dorsal setae; ventral and coxal setae similar to genital setae; no setae on coxae IV; all setae strongly barbed. Femora I and IV divided into basifemur and telofemur; leg setae long and entirely barbed; tarsus I with long slender solenidion; tarsus II with short, stout solenidion; tarsus III with short, slender solenidion; tibiae I, III, and IV each with a long, slender bothridion. Length of leg segments as follows—tarsus to femur in microns: I, 129–94–80–113; II, 113–55–55–81; III, 135–74–65–81; IV, 171–90–74–97. Setal lengths in relation to leg segments are as figured.

Male (allotype). Length of idiosoma 383 μ; length of gnathosoma 96 μ. Propodosomal shield 145 μ long, parallel sided and rounded posteriorly; 48 μ between 1st, 2nd, and 3rd pair of shield setae, and 52 μ between 4th pair. First pair of shield setae 48 μ long, 2nd pair 81 μ long, 3rd pair 84 μ long, and 4th pair 103 μ long; humeral and other dorsal body setae 100–103 μ long; all dorsal body setae strongly barbed; anal setae short and smooth. Chelicerae 81 μ long; peri-

[1] Immediate publication secured by full payment of page charges—Editor.



Figs. 1–4, *Pimeliaphilus trogadermus,* n. sp.: 1, dorsal view, ♀; 2, gnathosoma, ♀; 3, dorsal view, ♂; 4, ventral body seta, ♂.

tremes short and not reaching margins of gnathosoma; femora and patella of palps not fused; femoral setae short, about 18 μ long, and strongly barbed. With two pairs of hysterosomal plates, the anterior pair small, the posterior pair large and reaching ventrally; all plates bearing two pairs of setae. Ventral body and coxal setae as in female. Femora I and IV not divided; tibia I, III, and IV each with a slender bothridion, and tarsus I, II, and III each with a solenidion. Lengths of leg segments as follows—tarsus to femur in microns: I, 106–65–58–90; II, 87–42–42–48; III, 106–48–42–45; IV, 119–55–45–65. Lengths of leg setae in relation to segments are as figured.

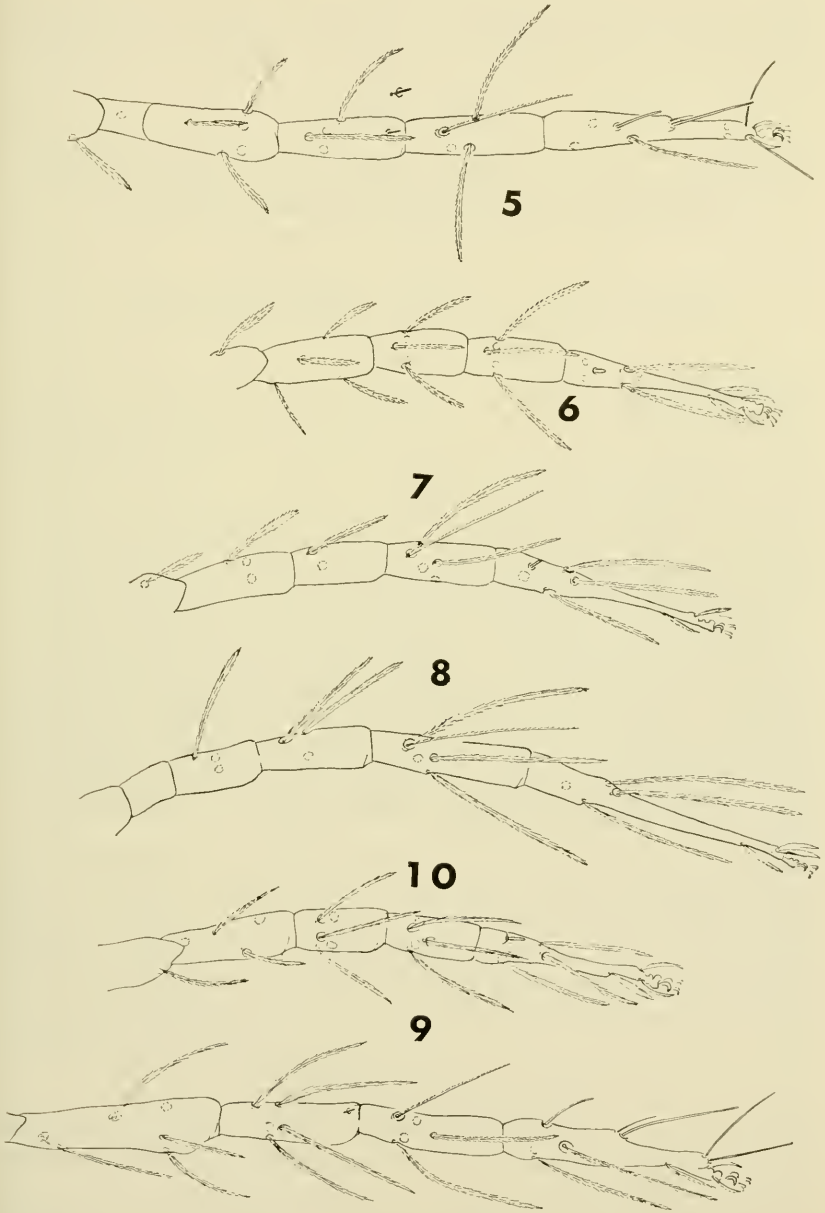
Holotype. Female, *ex Trogoderma parabile,* University of California, Riverside, California, March 25, 1966 by Gregory J. Partida.

Allotype. Male with the above data.

Paratypes. Two males with the above date.

Eight nymphs were also in the series.

The holotype and allotype are in the U. S. National Museum (no. 3249); a male paratype and a nymph are in the collection in the Department of Biology, University of California, Riverside; a male paratype and a nymph are in the collection of the Bureau of Entomology, State of California, Sacramento, California.



Figs. 5–10, *Pimeliaphilus trogadermus*, n. sp.: 5, leg I, ♀; 6, leg II, ♀; 7, leg III, ♀; 8, leg IV, ♀; 9, leg I, ♂; 10, leg II, ♂.

REFERENCE

Newell, I. M. *and* **R. E. Ryckman.** 1966. Species of *Pimeliaphilus* (Acari: Pterygosomidae) attacking insects, with particular reference to the species parasitizing Triatomae (Hemiptera: Reduviidae). Hilgardia 37(12):403–435.

A REVIEW OF THE OBTECTUS GROUP IN ACANTHOSCELIDES SCHLISKY, WITH DESIGNATIONS OF LECTOTYPES

(COLEOPTERA: BRUCHIDAE: BRUCHINAE)

JOHN M. KINGSOLVER, *Systematic Entomology Laboratory, U. S. Department of Agriculture, Washington, D. C. 20560*

Much confusion has centered around the correct scientific name to be used for the bean weevil (or bruchid) now accepted as *Acanthoscelides obtectus* (Say). Bridwell furnished a list of synonymy for this species in Larson and Fisher (1938), but many of the names included were undoubtedly placed there from descriptions only and must be checked by examination of type specimens. In 1942, Bridwell published a resumé of the nomenclatural history of the bean bruchid and described two closely related new species in the Neotropical Region, *A. obreptus* and *A. obvelatus*, which also infest stored beans, but he did not include illustrations of them. The specimens upon which the descriptions were based are deposited in the U. S. National Museum Collection, but types unfortunately were never selected by Bridwell. In the same paper, he also gave a footnote reference to the true identity of *A. obsoletus* (Say), the name of which has often been applied to the bean bruchid but which belongs to a different species group.

As early as 1892, C. V. Riley recognized the distinctness of *A. obtectus* and *A. obsoletus* which had been confused by Horn in 1873 and again by LeConte and Horn in 1877. However, this error by LeConte and Horn was perpetuated by Pic (1913) in his catalogue of Bruchidae, which caused further confusion. *Acanthoscelides obsoletus* has been reared only from seed of the genus *Tephrosia* (= *Cracca*) and has not been known to infest any other genus of plants. Say (1831) apparently mistakenly identified the host of *obsoletus* as *Astragalus*, because he also reared from the same seeds the curculionid *Apion segnipes* Say which is restricted in host to *Tephrosia virginiana* (L.) Pers. This combination of insect species has since been reared from *T. virginiana*.

The purpose of the present paper is to designate lectotypes of *Acanthoscelides obreptus* and *A. obvelatus*, and to illustrate salient characters for ease in identification of *A. obtectus*, *A. obreptus*, and

A. obvelatus. The male genitalia of *A. obsoletus* are also illustrated for contrast.

The *obtectus* group is described in detail by Bridwell (1942, p. 253), but the principal group characters are illustrated here. Those to be noted especially are the arcuate lateral margins of the pronotal disk (fig. 13), the shape of the antennae (essentially identical in both sexes, fig. 20), the shape of the head and eyes (fig. 18), the obsolete frontal carina (fig. 18), the regularity of the elytral striae (fig. 13), the shape and dentition of the hind leg (fig. 15), the lack of modification of the basal abdominal sternite in the male, the expanded apices of the lateral lobes that form a hoodlike cover above the apex of the median lobe (figs. 2, 5, 9), the shape of the ventral valve of the median lobe, and the arrangement of the armature of the internal sac (figs. 1, 4, 7). An additional character not mentioned by Bridwell is the presence of a small denticle at the extreme base of the third, fourth, and fifth striae. This character may be useful in relating this group to others in *Acanthoscelides* and in other genera.

The following key is taken as published by Bridwell (1942).

KEY TO THE OBTECTUS GROUP OF **Acanthoscelides** SCHILSKY, 1905

1. Antenna, legs, and pygidium entirely reddish; ovipositor strongly sclerotized, ending in two closely applied, spinelike processes, margin narrowing before the apex with a dentiform tubercle on each side ..... **obreptus** Bridwell

   Antenna dark gray in the middle; ovipositor neither strongly sclerotized at apex nor acute 2

2. Antenna dark gray except at base beneath, segments longer than broad; pygidium and hind leg usually dark ..... **obvelatus** Bridwell

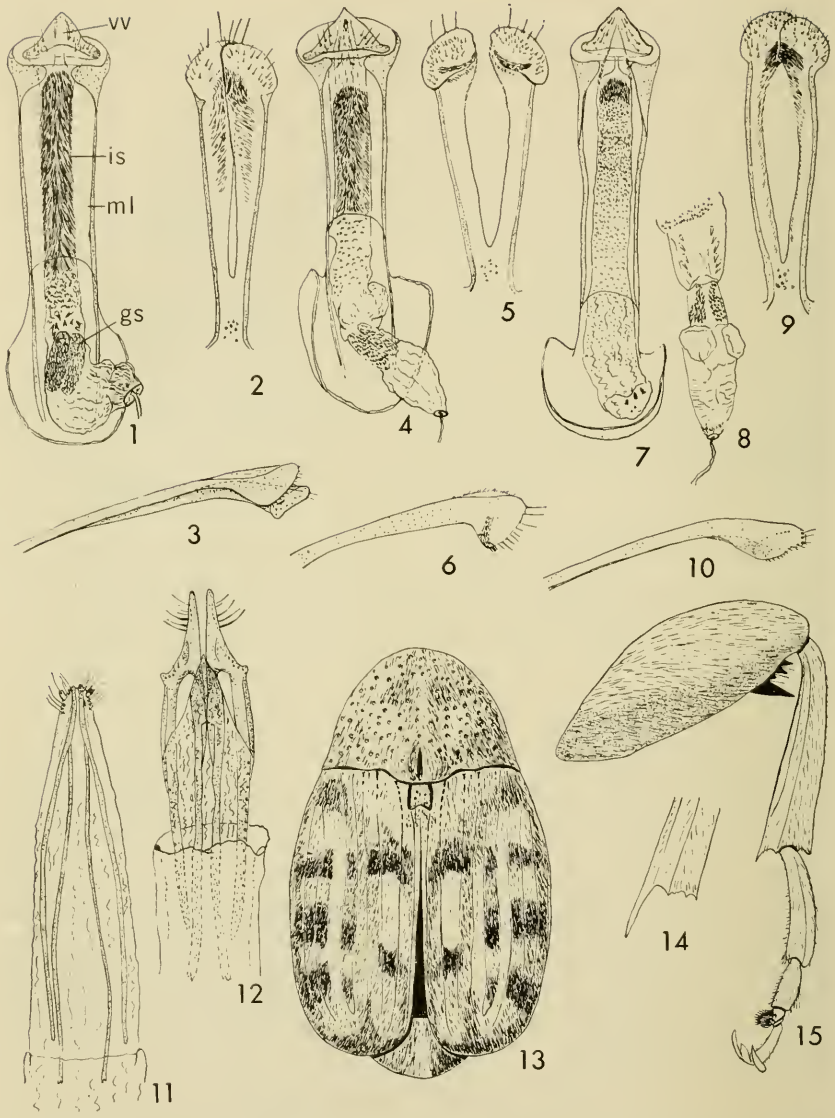
   Antenna with apical segment red, segments 7–10 broader than long; hind leg red except along lower margin of femur; pygidium red **obtectus** (Say)

The strongly sclerotized ovipositor of *A. obreptus* (fig. 12), as Bridwell has noted, is unlike that of any other known bruchid except the distantly related *A. oblongoguttatus* (Fahraeus) from Mexico. *Acanthoscelides obtectus* is easily recognized by its red abdomen, red terminal antennal segment, and bronzy-gray elytra. Characteristics in the male genitalia are consistent and definitive when proper preparations have been made.

Acanthoscelides obreptus Bridwell
(Figs. 7, 8, 9, 10, 12)

Acanthoscelides obreptus Bridwell, 1942, p. 256.

Color.—Mostly reddish dorsally with darker borders on elytra, occasionally darker on disk, vestiture gray with bronzy sheen, with vague maculations of brown hairs, elongate whitish mark on third interval limited anteriorly and posteriorly by brown spots, thorax and middle of abdomen piceous ventrally,



Figs. 1–15, *Acanthoscelides* spp. Figs. 1–3, *obtectus* ♂: 1, median lobe, ventral; 2, lateral lobes, ventral; 3, lateral lobes, lateral. Figs. 4–6, *obvelatus* ♂: 4, median lobe, ventral; 5, lateral lobes, ventral; 6, lateral lobes, lateral. Figs. 7–10, *obreptus* ♂: 7, median lobe, ventral; 8, apex of internal sac; 9, lateral lobes, ventral; 10, lateral lobes, lateral. Fig. 11, *obtectus* ♀, apex of ovipositor. Fig. 12, *obreptus* ♀, apex of ovipositor. Fig. 13, *obtectus*, dorsal habitus. Fig. 14, *obsoletus*, apex of hind tibia. Fig. 15, *obtectus*, hind leg. Abbreviations: *vv*, ventral valve; *is*, internal sac; *ml*, median lobe; *gs*, gonopore sclerites.

lateral areas of abdomen, antenna, and legs red except for lower margin of hind femur and occasionally median portion of hind tibia. Pygidium reddish to piceous, covered with yellowish vestiture. Male genitalia.—Ventral valve with lateral margins noticeably angulate, lateral lobes expanded at apices, overlapping apically, pedicels bowed, dense patch of fine spicules on mesal margin near apex of each lateral lobe (figs. 9, 10), internal sac with fine hairlike spicules only near apical orifice, remainder with ridges and small, blunt denticles nearly to gonopore sclerites, two rows of fine, acute denticles near gonopore sclerites, apex complex (figs. 7, 8). Female genitalia.—(fig. 12) apices of strengthening rods thickened, acute apically, papillae absent.

This species is known from Mexico, Guatemala, Panama, Haiti, Trinidad, Venezuela, Colombia, Peru, and Chile. All specimens with recorded host plants are from *Phaseolus lunatus* L., except the series from Trinidad which was reared from *Dolichos lablab* L. The species has been intercepted numerous times in Plant Quarantine inspections.

The male lectotype (USNM 69235) has been selected from a series of 75 specimens from Colonia Mendoza, Venezuela, reared April, 1938 from *Phaseolus lunatus* seed by C. H. Ballou.

Acanthoscelides obvelatus Bridwell
(Figs. 4, 5, 6)

Acanthoscelides obvelatus Bridwell, 1942, p. 257.

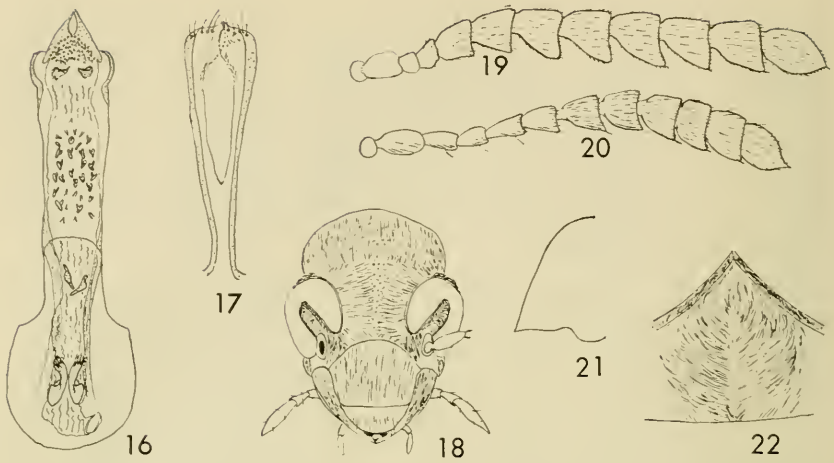
Color.—Piceous, vestiture gray with indistinct brownish maculae on elytra, distinct elongate white mark at middle of third elytral interval, fore and middle legs and posterior margins of abdominal sternites occasionally with reddish suffusion; ventral side of basal four antennal segments reddish; pygidium piceous with gray vestiture condensed into fine median line. Male genitalia.—(figs. 4, 5, 6). Median lobe elongate, ventral valve triangular, base hoodlike; lateral lobes somewhat divergent, spatulate, with prominent ridge of fine spicules on mesal margin near apex of each lobe, in lateral aspect strongly angulate at base of apical expansion (figs. 5, 6); internal sac with fine spicules extending about half the distance from apical orifice to gonopore sclerites, then with broad ridges and denticulations in remaining half. Female genitalia.—As in *A. obtectus* (fig. 11).

This species was described from a series taken in San Cristobal, Chiapas, Mexico in 1931 in *Phaseolus vulgaris* L., and the male lectotype (USNM 69236) was selected from this collection. Subsequent Plant Quarantine interceptions have been made in *Phaseolus vulgaris* varieties (principally black beans) from Guatemala and Colombia.

Acanthoscelides obtectus (Say)
(Figs. 1, 2, 3, 11, 13, 15, 18, 20)

Bruchus obtectus Say, 1831, p. l. (LeConte Edition, Vol. 1, p. 259).

For further synonymy, see Larsen and Fisher (1938, p. 4–5). Includes *Bruchus irresectus* Fahraeus, 1839, designated as type-species of *Acanthoscelides* Schilsky, 1905 by Bridwell, 1929, p. 42. *A. obtectus* was listed in synonymy of *A. irresectus* by Schilsky, 1905.



Figs. 16–22, *Acanthoscelides* spp. Figs. 16–17, *obsoletus* ♂: 16, median lobe, ventral; 17, lateral lobes, ventral. Fig. 18, *obtectus*, front of head. Fig. 19, *obsoletus*, ♂ antenna. Fig. 20, *obtectus*, ♂ & ♀ antenna. Fig. 21–22, *obsoletus*; 21, outline of lateral margin of prothoracic disk; 22, middle of basal abdominal sternite, ♂.

Color.—Darker maculations of elytra brownish with bronzy tinge, lighter areas yellowish-gray with bronze overtones, middle of third interval of each elytron with characteristic elongate lighter mark; following areas red: pygidium, lateral areas of abdomen, posterior margin of each abdominal sternite, basal four segments and terminal segment of each antenna, fore and middle legs except occasionally darker at the extreme base of femur, hind legs except along ventral margin of each femur (fig. 15). Male genitalia.—(figs. 1, 2, 3). Median lobe elongate; ventral valve triangular, slightly arcuate on lateral margins; lateral lobes (fig. 3) overlapping at apices, mesal margins nearly straight; internal sac with fine spicules extending more than half length of sac, cluster of coarser spicules near gonopore sclerites. Female genitalia.—(fig. 11) membranous except at apex; strengthening rods elongate, slender.

Acanthoscelides obtectus is an almost cosmopolitan pest of stored *Phaseolus* spp. bean seeds as well as other commercial seeds and is well known in agricultural regions around the world. Say's holotype has been lost, but because the species is so universally known, I do not think it necessary to designate a neotype.

The three species in the *obtectus* group can be differentiated by the external characters given in the key and by characters in the male genitalia. The similarity among the three species in the median lobe is apparent in the illustrations, but the most striking differentiating characters are to be found in the lateral lobes. In the female genitalia, those of *obtectus* and *obvelatus* are not greatly different from those found in other species now placed in the composite genus *Acantho-*

scelides, but the radical form found in *A. obreptus* suggests that different oviposition habits might be found in this species.

Acanthoscelides obsoletus (Say)
(Figs. 14, 16, 17, 19, 21, 22)

Bruchus obsoletus Say, 1831, p. 2.

Whether *A. obsoletus* alone constitutes a species group or will be a member of a larger group awaits a revision of the genus for the New World, a study now in progress.

For present purposes, the following characters differentiate *A. obsoletus* from the members of the *A. obtectus* group: lateral margins of prothorax nearly straight in dorsal aspect (fig. 21); third and fourth striae approximate at base, each ending basally in a polished black denticle slightly raised above the surrounding area; hind tibia with long, slender mucro (fig. 14); male antenna long, broadly serrate (fig. 19); basal abdominal sternite in male with median elongated depression fringed with incurving hairs (fig. 22); frontal carina evident but not prominent; ventral valve equilaterally triangular; apices of lateral lobes scarcely reaching apex of median lobe, not hoodlike (fig. 17); armature of internal sac composed of coarser spicules and denticles (fig. 16). The female antenna is similar to fig. 20. The hind femur of *A. obsoletus* is essentially as in the *obtectus* group (fig. 15).

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A NOTE ON THE SLEEPING BEHAVIOR OF PHILANTHUS GIBBOSUS (FABRICIUS) (HYMENOPTERA: SPHECIDAE)

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The sleeping behavior of solitary bees and wasps has recently received considerable attention (Evans and Linsley, 1960; Linsley, 1962). However, our state of knowledge of this most interesting subject is at present quite fragmentary. *Philanthus* is no exception, with the sleeping behavior of most species being unreported. Several brief accounts, however, have appeared on the sleeping behavior of *P. gibbosus* (Fabricius) (Peckham and Peckham, 1898; Rau and Rau, 1918; Reinhard, 1921–22) and the present study supports these accounts.

In the present study, a lone male of *P. gibbosus* was observed on July 4, 1966, in the Parade Grounds, a 40-acre field used for sandlot baseball in Brooklyn, New York. The male entered a hole or nest in the ground at 6:45 P.M. and was captured when it came out seconds later. This male was probably searching for a place to spend the night in accord with the observations of the Peckhams (1898). Later in the summer (August 9), a small colony of *P. gibbosus* was discovered in a different location in the Parade Grounds. Living wasps were last observed in this colony on September 2. On August 9, the colony consisted of a total of six nests devoid of any vegetational cover and located in the flat ground of a baseball diamond consisting of hard, bare, sandy soil, seemingly with a high clay content.

Evans and Lin (1959) found nine of ten nests studied dug into the side of vertical sand banks, and the tenth into flat sand. The two closest nests in the Parade Grounds colony were approximately 18 inches apart and the two furthest were approximately nine feet apart. No nest was more than an estimated five feet ten inches from its nearest neighbor, and all but one were approximately four feet or less from their nearest neighbor. At times, the heads of females could be seen "peering" from the entrances of nests. When the nests were approached the females usually withdrew within the nests, only to again reappear at the entrances within minutes. Such behavior was noted on several days. It was possible by approaching such nests cautiously to capture females in the entranceway before they could withdraw. Evans and Lin (1959) also noted such "peering" behavior and found that it preceded flight.

At 8:15 A.M. on August 30, the colony was again visited. Several nests were observed, all had outer closures, and three appeared to have been closed from the inside. A few other nests probably had permanent closures. Rectangular glass containers were placed over

the entrances of the three nests seemingly closed from the inside, so as to prevent wasps from entering or leaving the enclosed area. The observer then left the colony. When he returned at 10:30 A.M., he found wasps under two of the three glass traps. One trap contained a female and the other contained a male and a female. All three nests were now open. The male and female were captured for identification. The wasps had been in the nests the entire time and when they emerged between 8:15 A.M. and 10:30 A.M., they were detained by the traps. Presumably these wasps had spent the night in the nests.

On August 31 at 7:35 A.M. three nests were found, and all were closed. They were covered with glass traps and when reexamined at 9:20 A.M. and 11:30 A.M. all were open. No *Philanthus*, however, were in the traps. The nests had apparently been closed from the inside where the wasps had spent the night, and after opening the nests, the trapped wasps apparently reentered without again closing them.

At 8:50 A.M. on September 2, two nests (both closed) were located, and then covered with glass traps. One nest had previously been covered on August 31. Between 8:50 and 8:52 a *P. gibbosus* was observed to land for a few seconds on paper, and two others were seen in flight, one in an orientation flight. Wasps were not under the traps at 10:35 A.M. and 12:15 P.M.

On September 5 at 12:43 P.M. and 7:00 P.M. only one nest could be found in the colonial area and there was no evidence that it was recently active. Wasps were also not observed on September 9 at 1:30 P.M. nor September 18 at 12:23 P.M. A few traces of nests were found on September 9 and none on September 18.

Discussion

According to the Peckhams (1898) and Reinhard (1921–22) both males and females of *Philanthus gibbosus* temporarily share a common nest which includes sleeping in the nest. One such nest described by the Peckhams (1898) housed three males and four females. The Peckhams maintained that such wasps living in a common nest were siblings, and Reinhard (1921–22) likewise suggested that this might be the case. These authors, however, do not present any data to support this view. The Raus (1918) also found that females of *P. gibbosus* spend the night in the nest, but presented no data on males.

The present study supports the previous findings that males and females may spend the night together in the nests which are closed from the inside. In addition it was found that females apparently also spend the night by themselves in the nests which are likewise closed from the inside. No data, however, was obtained suggesting males and females using the same nest are siblings. Evans and Lin (1959) found that females of *Philanthus politus politus* Say and

Philanthus bilunatus Cresson spend the night in the nest which is then closed from the inside. Closure of the nest at night by *Philanthus* probably is an adaptation for keeping certain parasites or predators from entering the nest and in addition may also function in maintaining a more stable microclimatic environment within the nest.

Both sexes sleeping together in the nest appears to be relatively unknown among digger wasps. Another example is the nyssonine wasp *Clitemnestra gayi* (Spinola); the males and females are reported to spend the night together in the nest galleries (Janvier, 1928).

Reinhard (1921–22) found that *P. gibbosus* had two generations a year in Maryland. The first generation emerges during May and June and are found to be in "full swing" by the end of June. The second generation begins to make its appearance during the middle of July, and the gradual emergence continues until almost the end of August. In the present study a male was captured on July 4 and another was captured on August 30. It is well known that the males of solitary wasps are generally shorter lived than the females, and the presence of males in early July, and late August or early September suggests more than one generation. Furthermore, the limited data fits the Reinhard (1921–22) distribution, suggesting two generations a year in the Parade Grounds in New York. Evans and Lin (1959), however, state that *P. gibbosus* probably has one generation a year in Ithaca, New York. According to Evans and Lin (1959), *P. gibbosus* makes its appearance in Ithaca in early July and remains active until late September. Of course the data in the present study is fragmentary and it is by no means conclusive that *P. gibbosus* has two generations a year in Brooklyn.

I am indebted to Dr. Howard E. Evans for identifying the *Philanthus*. Funds for the summer of 1966 were provided in part by a Sigma Xi Grant-in-Aid of Research.

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A NEW GENUS AND THREE NEW SPECIES OF ERYTHRAEOIDEA

(ACARINA: ERYTHRAEIDAE AND SMARIDIDAE)

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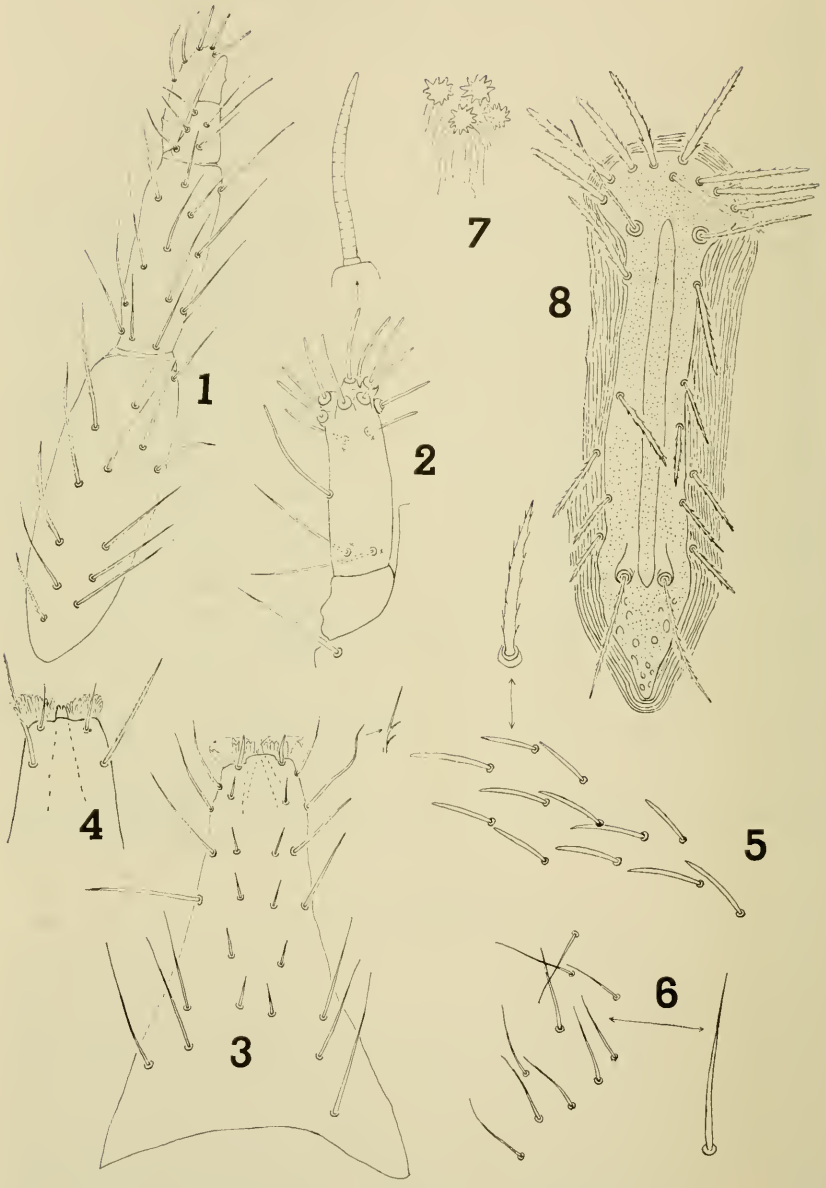
According to Baker and Wharton (1952), adults of the family Smarididae can be distinguished from those of the Erythraeidae by mouth parts that can be withdrawn into the body. Presently, this is the only practical character for separation; otherwise the resemblance between the families is marked. "Although in the adults the difference between these two families is striking—the presence of the armilla to the mouthparts being a character of undoubted family significance—in the larval Smarididae no feature can be seen in the mouthparts that can be considered of family significance" (Southcott, 1961). Southcott defines the *armilla* as the extensile collar bearing the gnathosoma in the Smarididae; the *armilla* is absent in the Erythraeidae. Also, Southcott (1946, 1948) used the tarsal claws to distinguish larval smaridids from erythraeids and (1961) presented a detailed account of the validity of this character. Included in the present paper are descriptions of two erythraeids belonging to the genera *Balaustium* Heyden and *Sphaerolophus* Berlese. The location of the eyes and sensory pits and the shape of the palpal tarsi will separate the two genera. A new genus, *Paraphanolophus*, is being erected to include a larval form belonging to the family Smarididae. The new species of *Balaustium* and *Sphaerolophus* were sent to me by Dr. W. L. Putman, Research Branch, Canada Department of Agriculture, Vineland Station, Ontario, Canada. The *Balaustium* species was reared and used in an insemination study (Putnam, 1966).

Balaustium putmani, n. sp.

(Figs. 1–10)

This species is characterized by the anterior portion of the crista being truncate in both sexes.

Female. Palpi long and strong; palpal tibia with short, stout distal claw possessing a single tooth (fig. 1); palpal setae long and slender, lightly serrated, intermixed with simple setae; palpal tarsus elongate, longer than tibia, with 10–12 strong solenidia (fig. 2) apically. Anterior venter of gnathosoma (fig. 3) has a cupshaped structure, with fingerlike projections, and with a pair of spurs ventrally; medially with 5 pairs of short, lightly serrated setae and 7 pairs of similar but longer setae laterally and posteriorly. Anterior dorsum of gnathosoma (fig. 4) with a pair of short simple setae and a longer serrate pair. Setae (fig. 5) of dorsal propodosoma and hysterosoma serrated, subequal in length; those of venter (fig. 6) simple. A single pair of lenslike eyes and a single pair of sensory pits located at about the posterior level of the crista (fig. 9). Crista (fig. 8)



Figs. 1–8, *Balaustium putmani*, n. sp., ♀: 1, left palpus; 2, palpal tarsus; 3, venter of gnathosoma; 4, dorsum of gnathosoma; 5, dorsal setation; 6, ventral setation; 7, striae above crista metopica; 8, crista metopica.

long, narrow, lightly punctate, with a strongly sclerotized ribbonlike longitudinal median band; a pair of medium-length serrated sensory setae on the anterior and posterior area; posterior sensory setae arising from noselike projections of scutum; with 9 stout serrated setae anteriorly to the anterior sensory setae, 3 pairs of shorter setae, and a single subequal serrate seta between the anterior and posterior sensory setae. A fine distinct ornamentation of the striae (fig. 7) anteriorly to the crista. Legs I one-third longer than legs IV; legs II shortest; legs III slightly longer than legs II; legs IV slightly longer than legs III. Tarsus I (fig. 10) with simple setae dorsally (T); apically with few lightly serrated (A); laterally with solenidia (X) intermixed with many comblike setae (V) at the anterior ventral portion, extending to about midlength of tarsus; posteriorly and ventrally with few smaller serrated setae (Z). Tibia I dorsally with few serrated setae varying in length (A), and solenida (X); laterally with many simple setae (T). Tarsus I 186 μ long and tibia I 226 μ long. Length of body, not including gnathosoma, 1600 μ.

Male. Crista metopica similar to that of female, long, narrow, lightly punctate, and with a strong sclerotized ribbonlike longitudinal median band; with a pair of slender serrated sensory setae on anterior and posterior area; with 5 stout serrated setae anteriorly to anterior sensory setae; 4 pairs of stout serrate setae between anterior and posterior sensory setae. Dorsal and ventral body setae similar to those of female. Length of body, not including gnathosoma, 840 μ.

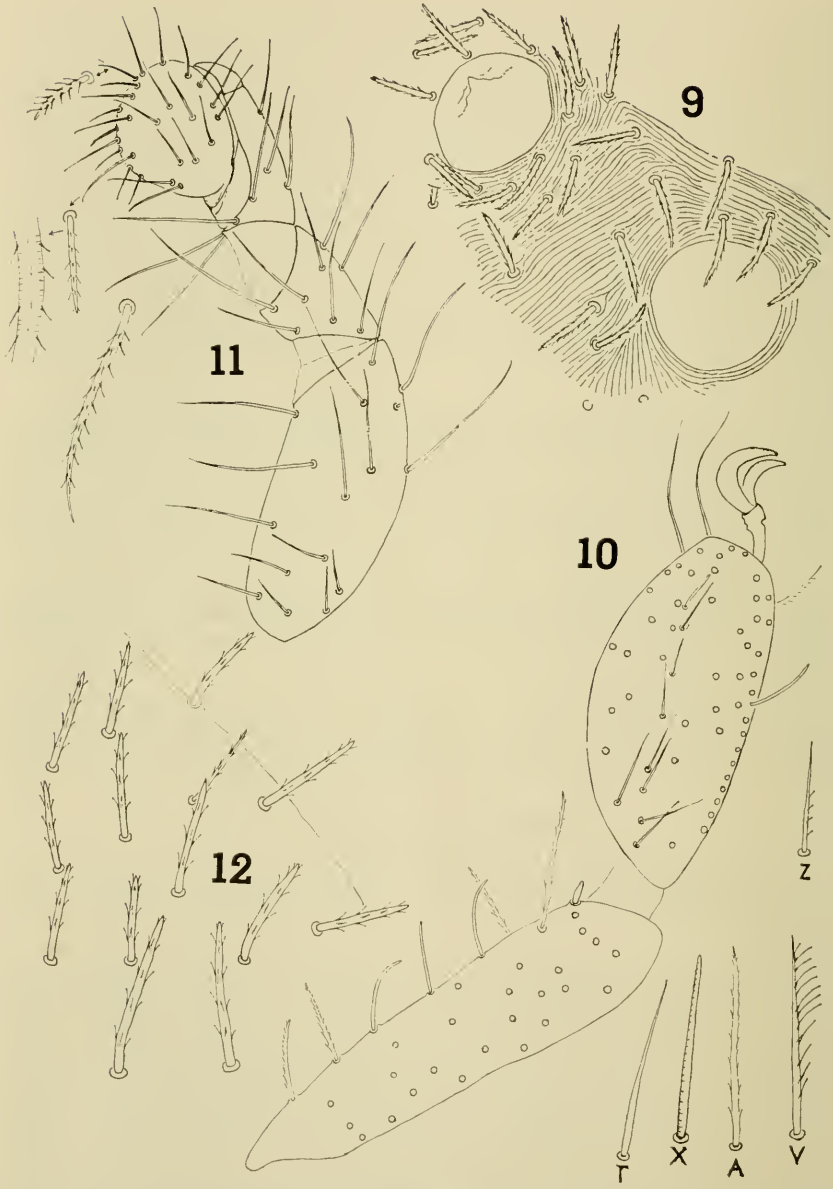
Holotype. Female, Canadian National Collection No. 9451, was collected and reared from plum bark, Vineland Station, Ontario, Canada, by W. L. Putman, 28 August 1961 for whom the species is named.

Paratypes. 2 males and 7 females with the above data. Three females and a male paratype are in the U. S. National Museum Collection, and the rest are in the Canadian National Collection.

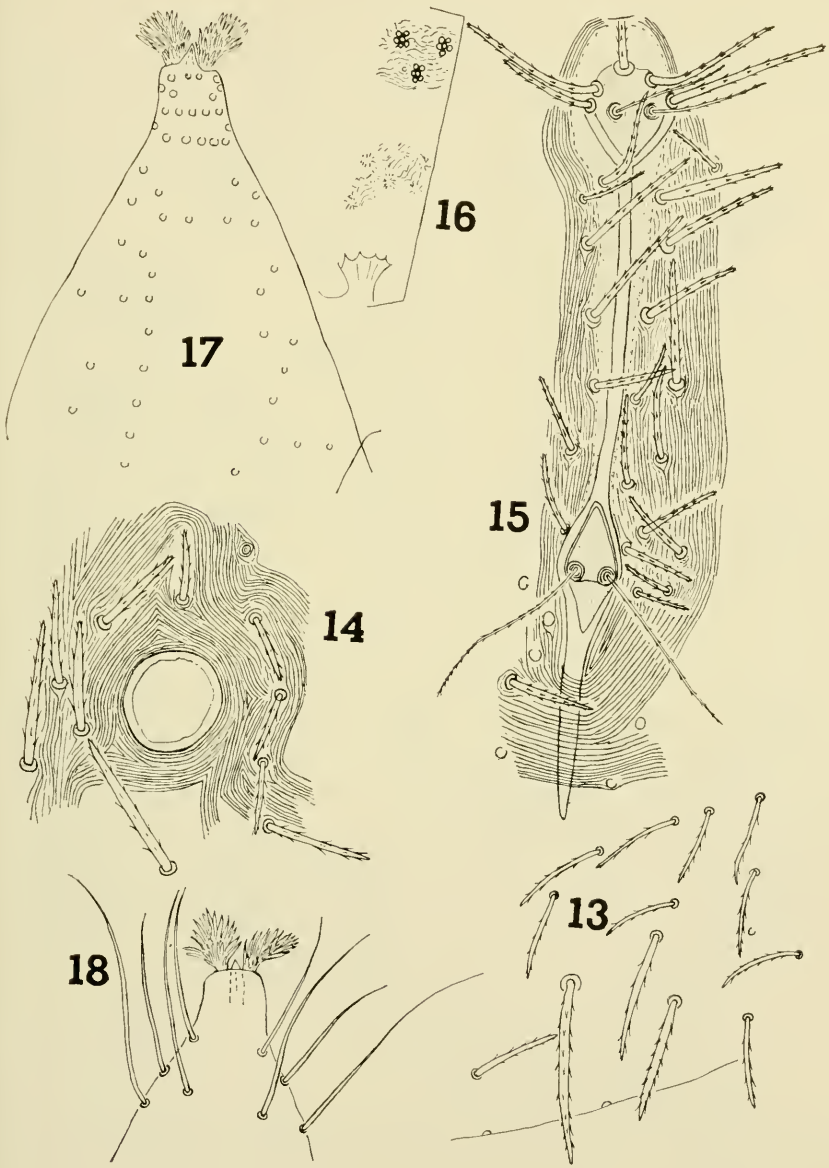
Sphaerolophus canadensis, n. sp.
(Figs. 11–19)

This is the first species of this genus recorded from North America. The species is distinctive in that the posterior portion of the crista is beneath the cuticle.

Female. Palpi strong; palpal tibia with short claw (fig. 11); palpal tarsus strong, globe-shaped, with subequal finely serrated setae dorsally, and with few shorter finely serrated setae apically; with annulated solenidia ventrally. Setae of the dorsal propodosoma (fig. 12) strong, serrated, and subequal. Venter of propodosoma (fig. 13) with serrated setae varying in length and size. Dorsally a single pair of lenslike eyes (fig. 14) located adjacent to middle of crista. Crista (fig. 15) long, narrow, slightly rounded anteriorly and pointed posteriorly; with a narrow, ribbonlike, longitudinal band; anteriorly with a pair of slender, lightly serrated sensory setae and 5, long, stout, strong serrate setae; posteriorly with a single pair of serrated setae slightly longer than anterior pair; median lateral area of crista intermixed with 4 pairs of stout serrated setae varying in length and with 5 pairs of shorter and smaller serrated setae. Striae (fig. 16) anterior to crista as figured. Venter of gnathosoma (fig. 17) anteriorly with fingerlike projections and with 10 pairs of serrated setae; subequal in length; posteriorly



Figs. 9 and 10, *Balaustium putmani*, n. sp., ♀: 9, right eye; 10, right tarsus and tibia I. Figs. 11 and 12, *Spaerolophus canadensis*, n. sp., ♀: 11, right palpus; 12, dorsal setation.



Figs. 13–18, *Spaerolophus canadensis,* n. sp., ♀: 13, ventral setation; 14, right eye; 15, crista metopica; 16, striae above crista metopica; 17, venter of gnathosoma; 18, dorsum of gnathosoma.

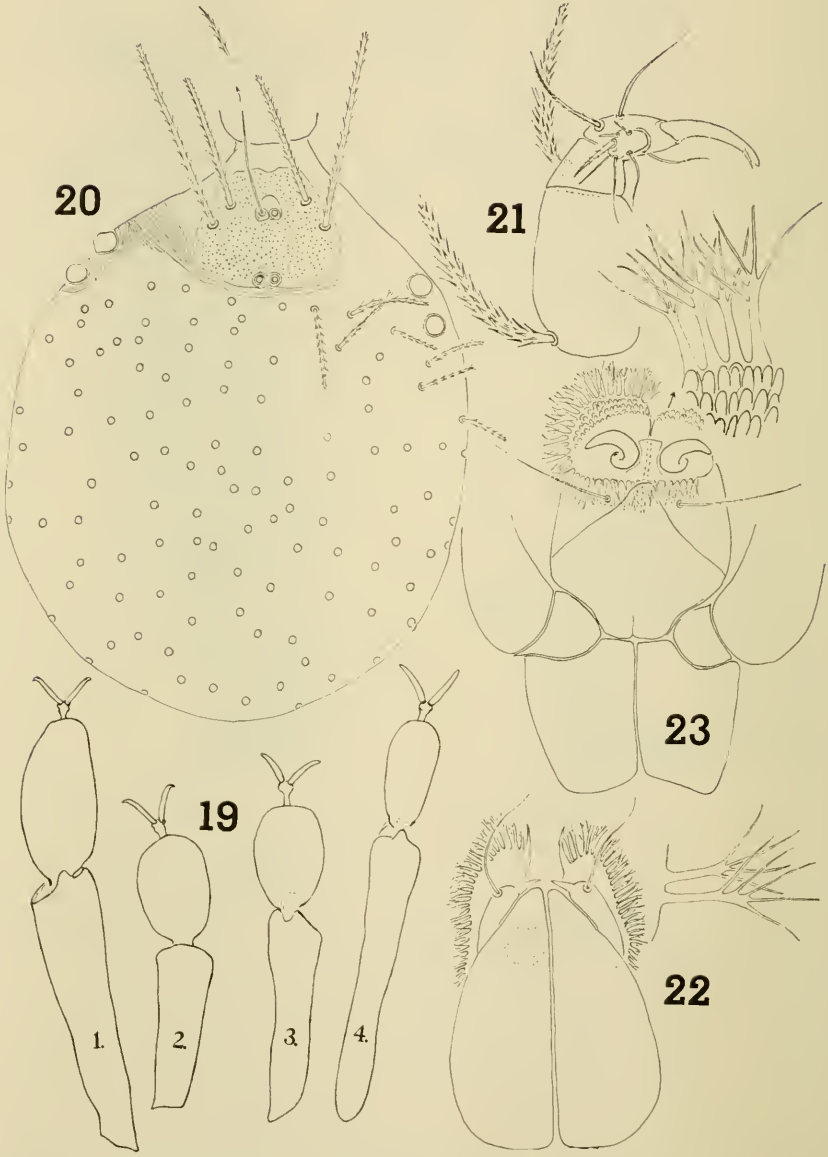
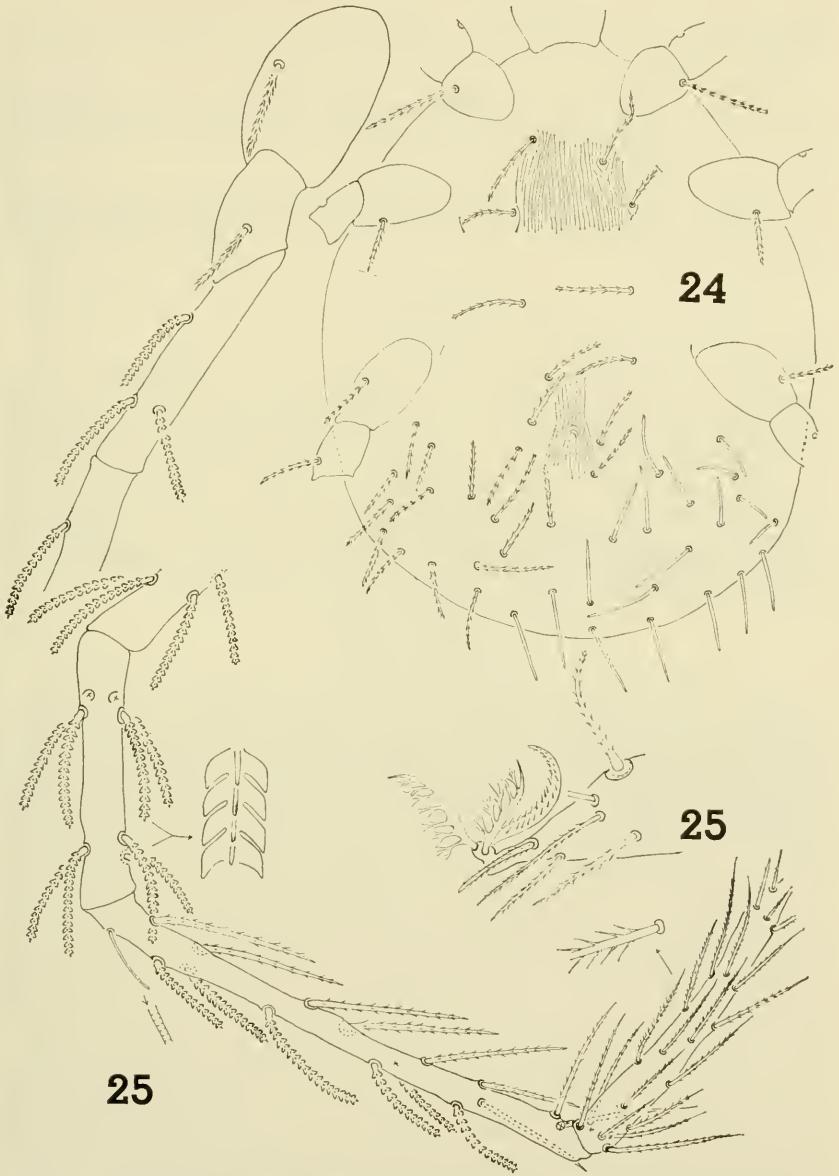


Fig. 19, *Spaerolophus canadensis*, n. sp., ♀: diagrammatic presentation of tarsi and tibiae I-IV. Figs. 20–23, *Paraphanolophus metcalfei*, n. sp., larva: 20, dorsum; 21, left palpus; 22, dorsum of gnathosoma; 23, venter of gnathosoma.



Figs. 24 and 25, *Paraphanolophus metcalfei*, n. sp., larva: 24, venter; 25, leg III.

with 30 pairs of longer and stronger serrated setae. Dorsum of gnathosoma with 4 pairs of finely serrated seta (fig. 18). Legs I longer than body; legs II shortest; legs III slightly longer than leg II, but not as long as legs I; legs IV longest; leg setae serrated, long, and numerous. Tarsi (fig. 19) of all legs slightly oval.

Tarsus I 253 μ long and tibia 493 μ. Length of body, not including gnathosoma, 1986 μ.

Male. Not known.

Holotype. Female, Canadian National Collection No. 9450, was collected from plum, Vineland Station, Ontario, Canada, 23 July 1964 by W. L. Putman.

Paratypes. Two females with the above data. A paratype is in the U. S. National Museum Collection and the Canadian National Collection.

Paraphanolophus, n. gen.

Type-species: *Paraphanolophus metcalfei,* n. sp.

This genus is distinctive in having the following: the tarsal claws are symmetrical and lightly ciliated along the ventral sides; the empodium is strong, falciform and nonpulvilliform; the scutal sensilla bases (anteriorly and posteriorly) are close together; there are only 2 pairs of ventral setae in the area bounded by coxae II and III, and at the anterior level of coxae III and extending to the posterior of hysterosoma there are 45 pairs of serrate setae subequal in length. According to Southcott's (1961) key to the genera of the larval Smarididae, this species is near the genus *Phanolophus* Andre but differs by having the forementioned characters.

Paraphanolophus metcalfei, n. sp.
(Figs. 20–25)

Larva. Body (fig. 20) globe-shaped with 2 eyes on each side near coxae II. Dorsal setae serrated, consistent in size and length medially; but varying in length marginally. Scutum rounded, excavated anteriorly, and lightly sclerotized; with a pair of long posterior and a pair of shorter anterior sensillae plus 2 pairs of serrated setae near antero lateral margin of scutum; second pair of serrated setae about one-fourth longer than first pair. Previous to remounting this specimen had all 4 sensillae. Venter of hysterosoma (fig. 24) with 45 pairs of serrate setae, subequal in length, smaller in size than setae of dorsum. Dorsum of gnathosoma (fig. 22) as figured. Venter of gnathosoma (fig. 23) with fingerlike projections and, surrounding oral cavity, the ciliae form a flange; with a pair of strong chelicerae; a pair of simple setae posterior to flange. Palpi (fig. 21) strong; palpal femur with a stout serrated seta, palpal genu with a stout serrated seta subequal in length to seta of femur; palpal tibia with 1 serrated and 2 simple setae (the anterior simple seta longer and stronger than posterior simple seta), with stout bifurcate distal claw; palpal tarsus with 2 subequal solenidia, 3 simple setae subequal in length, and an *eupathid.* Legs I and II subequal in length; legs III (fig. 25) slightly longer; all legs with coarse serrated setae and a few finer subequal serrated setae distally. Each tarsus with a strong distal *bothridon* dorsally and ventrally. Tarsus III 172 μ long and tibia III 346 μ long. Setal formula for legs I–III, coxae 1–1–1; trochanter 1–1–1; basifemora 4–4–4; telofemora 5–5–5; genua 9 + 2 – 8 – 8; tibiae 14 + 2 – 10 + 1 – 13 + 1; tarsi 24–24–24. The formula includes tactile and solenidia. Body, excluding gnathosoma, 680 μ long.

Adults and *Nymphs.* Not known.

Holotype. Larvae, USNM 3227, was collected on *Saccharosydne saccharivora* Westwood, British Honduras, 20 January 1967 by J. R. Metcalfe for whom this species is named.

Paratype. A larva with the above data is in the U. S. National Museum Collection.

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A REPORT ON THE SALDIDAE COLLECTED BY THE GALAPAGOS INTERNATIONAL SCIENTIFIC PROJECT 1964 (HEMIPTERA)[1]

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The following report is based on the material collected by members of the Galapagos International Scientific Project of 1964.[2] This material, exclusive of types, has been divided, as quantity permits, among the following individuals and institutions: California Academy of Sciences, R. L. Usinger, P. D. Ashlock, J. T. Polhemus, U. S. National Museum and B. P. Bishop Museum.

To date only one saldid has been noted from the Galapagos, *Pentacora sphacelata* (Uhler). This report adds a new species of the genus *Saldula* and notes on a saldid taken at light on a ship off Ecuador.

Pentacora sphacelata (Uhler)

Salda sphacelata Uhler, 1877, Bull. U. S. Geol. Geogr. Surv. 3:434–436 (Massachusetts, Maryland).

Salda rubromaculata Heidemann, 1901, Proc. Wash. Acad. Sci. 3:368–369 (Albemarle I., Galapagos).

The specimens of this species from the Galapagos seem quite typical, with no apparent shift in characters from our mainland material. *P. sphacelata* has been collected along the west coast of the

[1] Contribution No. 83 from the Charles Darwin Foundation for the Galapagos.

[2] Supported in part by Grant GE-2370 from the National Science Foundation.

Americas as far south as Guatemala, and further collecting will probably extend the range of this even further southward on the mainland. Specimens from the Galapagos material have been compared previously by Cobben (1965) to *sphacelata* and a closely related species, *Pentacora saratogae* Cobben, and his view concurs with mine.

Material: 6 ♂♂, 13 ♀♀, Galapagos Arch., Isla Baltra, 3–II–1964, D. Q. Cavagnaro; 1♂, Galapagos, Baltra Is., (S. Seymour), Feb. 3, 1964, P. D. Ashlock Collector; 1 ♂, 4 ♀♀, Galapagos Arch., Tortuga Bay, Santa Cruz Is., II–10–1964, *Heleotropium curassavicum*, G. Kuschel Collector.

Saldula sectilis (Hodgden)

Salda sectilis Hodgden, 1949, Jour. Kansas Ent. Soc. 22:160–161 (Canal Zone).

One specimen is present in the material, with the head and abdomen missing. The remains must be attributed to *Saldula sectilis*, as the unusual hemelytral pattern (fig. 2) is similar to the type of *sectilis* which I recently studied at the U. S. National Museum. Also, the coloration of the legs and shape of the pronotum match Hodgden's description and my type notes.

Material: One broken specimen, Ecuador, Guayaquil, Mar. 5, 1964. At light on ship, P. D. Ashlock Collector.

Saldula galapagosana, n. sp.

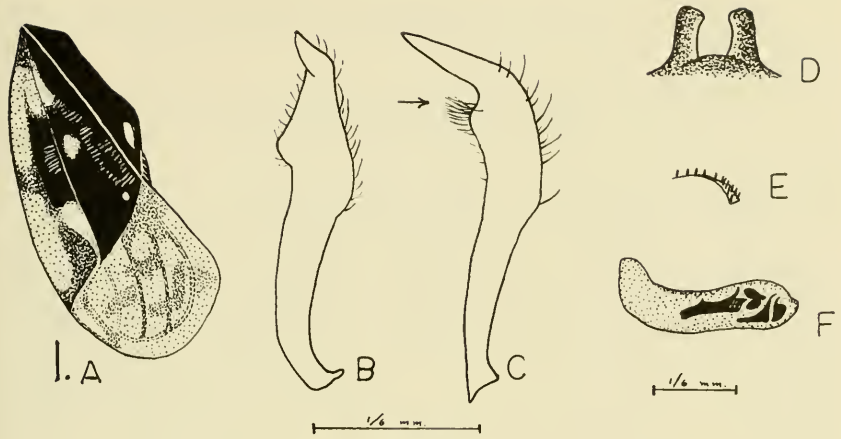
Of small size, moderately broad, general color piceous, macropterous. (For all measurements, 60 units equal 1 mm.)

Head: Black, shining, frons and vertex rugulose; preocellar spot yellowish; covered with short golden hairs and usual three pairs of long erect black hairs on frons and vertex; ocelli raised slightly and separated by approximately the width of an ocellus; rostrum brown, extending between hind coxae; clypeus and anteclypeus testaceous.

Thorax: Pronotum black, shining, rugulose, covered with short decumbent golden pubescence; lateral margins very slightly convex, narrowing moderately anteriorly; callus moderately raised, with deep depression in center, anterior lobe longer than posterior lobe (13/8, not including collar); underparts black, clothed with fine silver pubescence; scutellum width subequal to length (42/41), with vestiture similar to pronotum, depressed tranversely at center.

Wings: Hemelytra fully developed, covered with short decumbent golden and black pubescence; ground color dark brown to black, dull, very finely rugulose; pattern of markings as shown in fig. 1A, the three light markings in the inner corium being bluish-white pruinose areas in holotype, much bluer in some other specimens; embolar region largely flavo-testaceous in holotype, much darker in some other specimens; light brown to greenish pruinose areas occurring in an irregular elongate pattern on the inner corium and a medial area on the outer corium next to the corial suture; membrane fumose, with darker fumose markings, with four cells.

Abdomen: Piceous, covered with short, decumbent silver pubescence; caudal margins of segments sometimes narrowly margined with ochroleucus; in female, subgenital plate with caudal half ochroleucus to leucine, this portion being



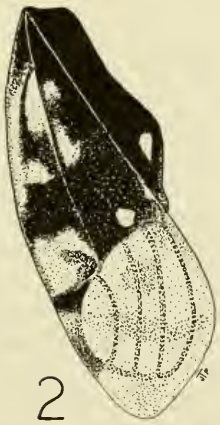


Fig. 1, *Saldula galapagosana,* n. sp.: A, left hemelytron; B, C, left ♂ paramere, two views; D, parandria; E, ♂ coupling plate; F, aedeagus, showing sclerotized structures. Fig. 2, S. *sectilis* (Hodgen), left hemelytron.

produced posteriorly; parandria as shown in fig. 1D; male coupling plate very narrow, with thirteen stout pegs as shown in fig. 1E.

Extremities: Antennal segment 1 flavo-testaceous, segment 2 testaceous, segments 3 and 4 blackish brown; segments 3 and 4 somewhat thickened, subequal in diameter to segment 1, segment 2 slenderest; segments 1, 3 and 4 clothed with short yellowish hairs, segment 2 clothed with brown hairs equal in length to segment width; segments 2, 3 and 4 with scattered longer hairs; antennal segments proportioned as follows: holotype ♂, 14:24:22:26; allotype ♀, 18:30:23:28.

Legs leucine to testaceous; femora testaceous on apical half, becoming leucine or ochroleucus at base; tibia ochroleucus, testaceous at base, sometimes with testaceous band at center and at apex, with usual dark spines.

Genitalia: Paramere as shown in figs. 1B and C, rugulose on main body and processus sensualsis; median sclerotized structure of aedeagus as in fig. 1F; filum gonopori coiled two and a half times.

Measurements: Holotype (♂), length 3.05 mm, width 1.35 mm; allotype (♀), length 3.35 mm, width 1.70 mm. Mean length of 10 ♂♂, 2.99 mm; min. 2.80 mm, max. 3.15 mm. Mean width of 10 ♂♂, 1.39 mm; min. 1.35 mm, max. 1.60 mm. Mean length of 6 ♀♀, 3.26 mm; min. 3.14 mm, max. 3.35 mm. Mean width of 6 ♀♀, 1.67 mm; min. 1.60 mm, max. 1.75 mm.

Material: Holotype, male (California Academy of Sciences), Galapagos Arch., Isla Santa Cruz, Grassland 750 M., IV–6, 1964, D. Q. Cavagnaro Collector; Allotype, female (California Academy of Sciences), Galapagos Arch., Isla Santiago, N.W. slope, 600 M., V–30, 1964, D. Q. Cavagnaro Collector. Paratypes as follows: 16 ♂♂, 4 ♀♀, 1 nymph, Galapagos Arch., Isla Santiago, N.W. slope, 600 M., V–30, 1964, D. Q. Cavagnaro Collector; 1 ♂, 2 ♀♀, Galapagos, N. of Academy Bay, Santa Cruz Is., Miconia Belt, 1300′ Elevation, II–20, 1964, P. D. Ashlock Collector; 1 ♀, 1 nymph, same island, collector and date, Grassland, 2100′ Elev.; 2 nymphs, same island and collector, Grassland, 1800′ Elev., II–18, 1964; 2 ♀♀, Galapagos Arch., Bella Vista, Santa Cruz I., 500 M., I–31–'64, G. Kuschel Collector.

Comparative Notes: *Saldula galapagosana* is most closely related to an undescribed species from Ecuador (contained in my collection), but also bears a resemblance to *S. penningtoni* Drake. The latter has male parameres of a very different form however; *penningtoni* stands very close to *S. dentulata* (Hodgden) in this respect, both species having the processus sensualsis produced. (An excellent figure of the paramere of *S. dentulata* is given by Cobben, 1960.) The whitish blue to blue pruinose areas on the inner corium will separate *galapagosana* from the closely related *Saldula* species known to me.

According to Drake's treatment of the saldids of Micronesia (Drake 1961), *galapagosana* does not closely resemble any of the species known from that region.

Zoogeography: The saldid fauna of the Galapagos seems closely allied to that of central and south America, although our knowledge of the latter fauna is still rather poor. *Saldula galapagosana* is most likely a sibling species arising from the same stock as the undescribed species mentioned before.

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NOTES ON NORTH AMERICAN PIOPHILIDAE. III.[1]
(DIPTERA)

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The types of some species of *Piophila* subgenus *Liopiophila* described by Melander and Spuler (1917) and Melander (1924), now deposited in the U. S. National Museum, were dissected in order to examine the male postabdomen and thus more firmly establish their identity. Lectotypes have been selected for three species, the names of two of which are now in synonymy. Bibliographic citations for all names will be found in the Catalog of the Diptera of America north of Mexico (Stone *et al.*, 1965).

Piophila (Liopiophila) nigrimana Meigen
(Fig. 1)

Piophila occipitalis Melander and Spuler, 1917. **New synonym.**
Piophila morator Melander, 1924. **New synonym.**
Piophila privigna Melander, 1924. Synonymy confirmed.

Examination of the male postabdomen of European and North and South American material of this species, as well as the types of *P. occipitalis* (lectotype from "Chicago, Illinois"), *P. morator* (unique male from "Pullman, Washington"), and *P. privigna* (lectotype from "Woods Hole, Massachusetts, 7–21–2"), has revealed a wide variation in general body color but a consistent and characteristic conformation of the postabdomen (fig. 1), with the bent peg on the sternum mentioned in my last note in this series. The peg is best considered as situated on the margin of the 7th sternum, rather than on the 6th, though these two sclerites are more or less fused. The long, coiled aedeagus is bare for an appreciable distance basally, and a ligulate sclerite (likely the anterior gonite) bears a pair of anteriorly directed setae, usually dark in color. The hypandrium in ventral view (h) is rather broadly bridged across where the basal part of the basiphallus is invaginated to form the phallapodeme.

The posterior margin of the 5th sternum is decidely sinuate.

Some of the material examined has the characters of coloration ascribed to *Piophila nigricornis* Meigen, a rarely captured European species. In view of the variation in color in extra-European material, it is highly probable that *P. nigricornis* also will be found to be merely a color variant of *P. nigrimana*. The front of *P. nigrimana* is usually largely yellowish, the antenna often infuscate apically, and the fore coxa and femur are sometimes wholly black, though usually the fore coxa is yellow and the fore femur is yellow basally for some distance.

[1] See these Proceedings 60:246, 1958 (paper I); 66:177–181, 1964 (paper II).

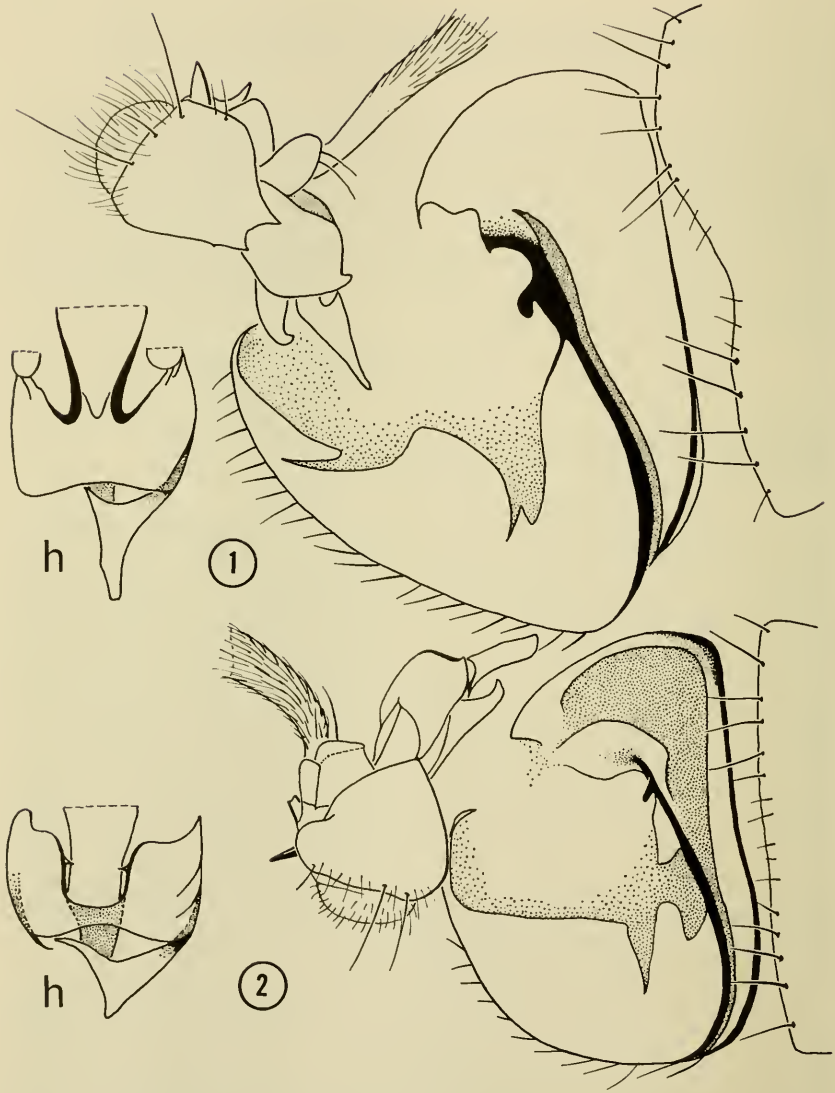

Fig. 1. *Piophila* (*Liopiophila*) *nigrimana* Meigen, male, Chicago, Illinois (lectotype of *P. occipitalis* Melander and Spuler), postabdomen. h = ventral view of hypandrium; fig. 2. *Piophila* (*Liopiophila*) *nigricoxa* Melander and Spuler, male, Pullman, Washington (lectotype), postabdomen. h = ventral view of hypandrium.

Piophila (Liopiophila) nigricoxa Melander and Spuler
(Fig. 2)

The postabdomen of *P. nigricoxa* is distinctly different from that of *P. nigrimana*; the peg of the 7th sternum is inclined but not bent, and the sclerotization of the 6th and 7th sterna differs in a number of ways. The long, coiled aedeagus is haired nearly to the base; the broad anterior gonite bears a long, apically directed, usually pale seta; and the hypandrium (h) is only narrowly bridged across where it becomes invaginated to form the phallapodeme.

The posterior margin of the 5th sternum is virtually straight.

External characters distinguishing *P. nigricoxa* from *P. nigrimana* are hard to find. In the available specimens, the front is black posteriorly and becomes abruptly yellowish at about ⅔ of the distance from the anterior ocellus to the anterior frontal margin; the antenna is bright orange-yellow; and the fore coxa and femur are black, except the extreme tip of the latter. At each side of the lower part of the back of the head in both species is a broad band of whitish pruinosity.

A male from "Pullman, Wash." has been selected as lectotype.

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THE GENUS MICROPLATYMERUS OF THE SEYCHELLES[1]
(Coleoptera: Curculionidae: Cossoninae)

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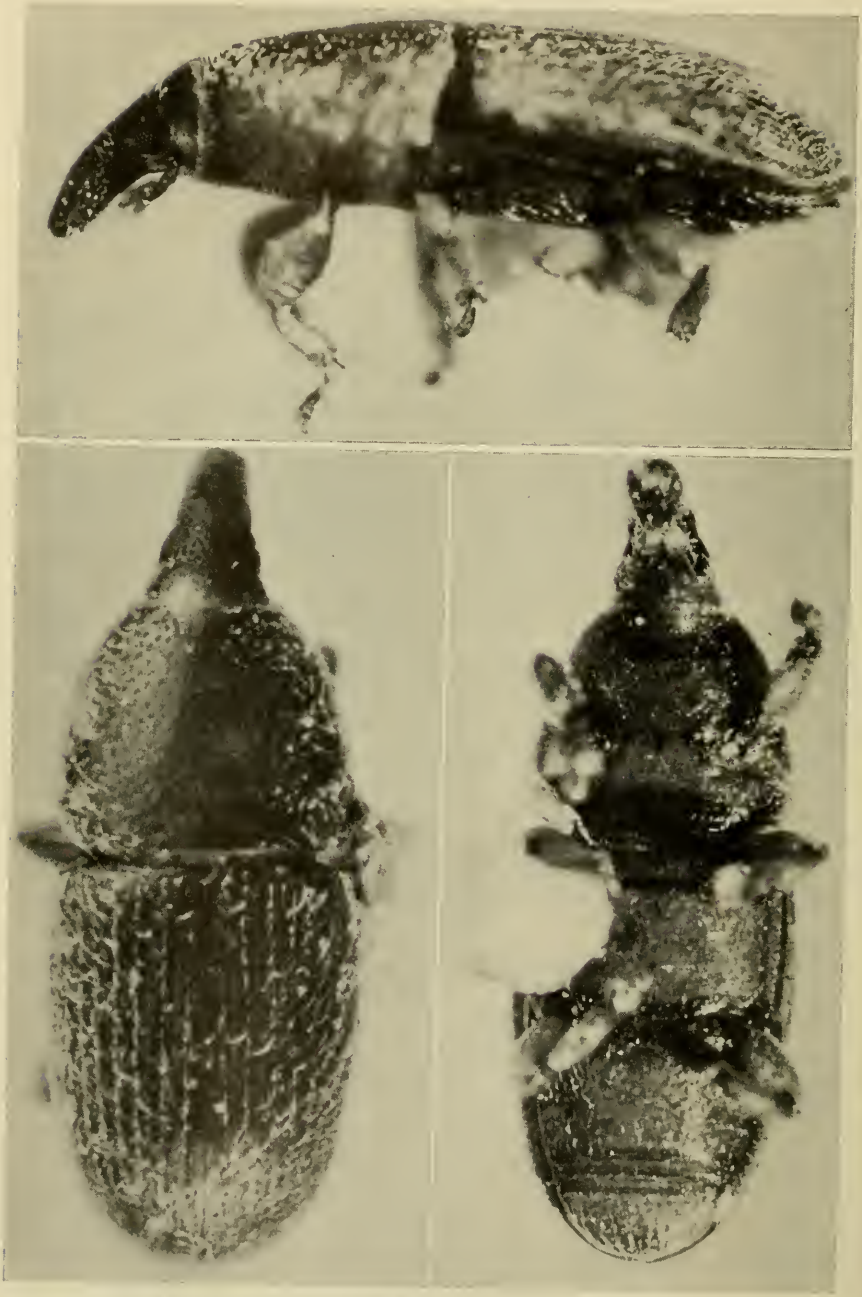
In 1908, Hugh Scott collected a large series of a small, amber-colored weevil from leaf bases of the strange coco-de-mer palm (*Lodoicea maldivica*) on Praslin Island, Seychelles, Indian Ocean. These were described as a new genus and new species, *Microplatymerus lodoiceivorus*, by George Champion in his report on the Curculionidae collected by the Percy Sladen Trust Expedition to the Indian Ocean in 1905 [Trans. Linnean Soc. London (II–Zoology) 16(14):451–452, pl. 24, figs. 37, 37 a–c, 1914], and since then the weevil has remained an enigma. Most unfortunately, numerous errors were made by Cham-

[1] This is number 14 of a series of reports resulting from studies made possible by National Science Foundation Grant G-18933.



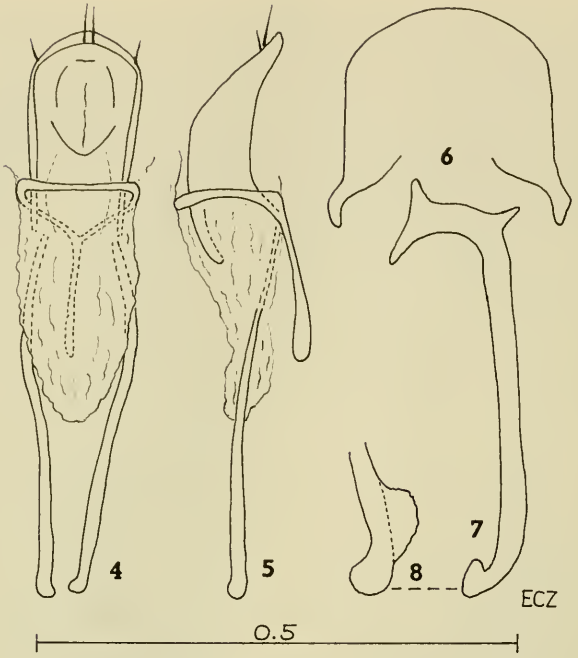
Figs. 1–3. *Microplatymerus lodoiceivorus* Champion, dorsal, lateral and ventral views. Total length: 2.1 mm. [B.M. (N.H.) photos.]

pion, and he wrongly concluded that the weevil belonged to the Antliarhininae. The Antliarhininae is a group of strange weevils attached to cycads in south Africa, and *Microplatymerus* bears no relationship to that group. The Antliarhininae have straight antennae, and they belong to a different major section of the Curculionidae than does *Microplatymerus* which has geniculate antennae.

In Coleopterorum Catalogus, pars 146, 1936, the four genera *Antliarhinus, Platymerus, Microplatymerus* and *Hoplorhinus* are listed by Klima in the Antliarhininae. Only *Antliarhinus* and *Platymerus* belong to the subfamily. *Hoplorhinus* was removed from the Antliarhininae later in 1936 by Csiki who placed it in Cossoninae: Trypetesini in pars 149 of Coleopterorum Catalogus. Much earlier, Champion, in Biologia Centrali-Americana (Insecta: Coleoptera) 4(4):277, 1903, had removed *Hoplorhinus* from the Antliarhininae and placed it in his "Group Hoplorrhina," which he then considered distinct from the Trypetesinae. (It should be noted that Champion used the term "group" for what generally are called subfamilies today.) He altered his opinion, however, when he published his 1910 work in Biologia Centrali-Americana (Insecta: Coleoptera) 4(7):4, 5, and he concluded that *Hoplorhinus* should be assigned to the Trypetesinae. Whether *Hoplorhinus* is or is not a member of the Trypetesinae, and whether there is such a natural group as the Trypetesinae, are separate questions beyond the scope of this report. The facts that *Hoplorhinus* is not a member of the Antliarhininae and is not related to *Microplatymerus* are what concern us here. The remaining genus, of the group under discussion, is *Microplatymerus,* and that genus must be transferred to the Cossoninae, as demonstrated below.

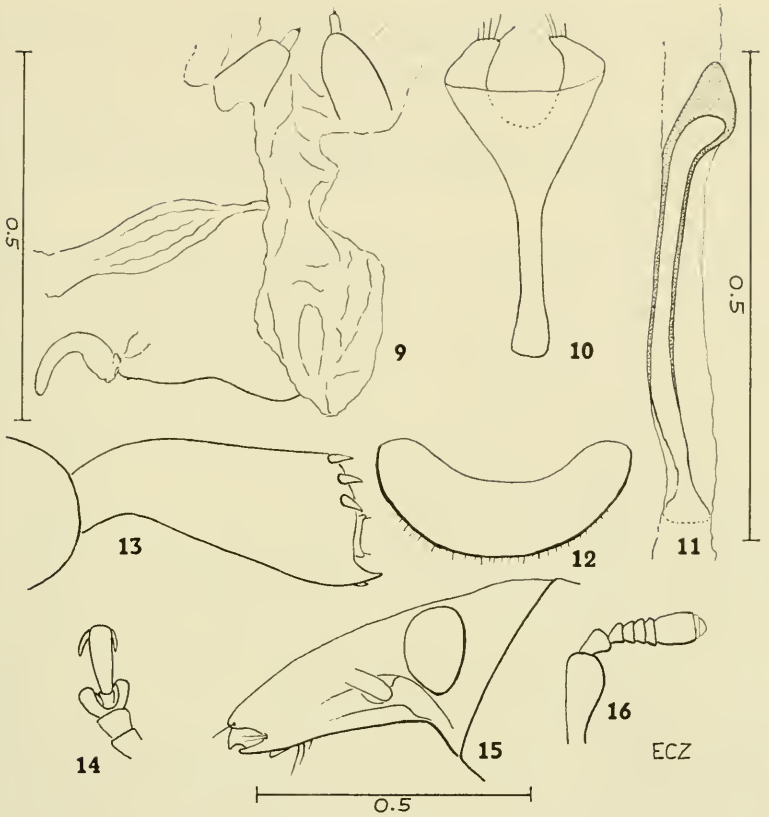
It is rather difficult to understand what led Champion to place *Microplatymerus* in association with such an aberrant group as the Antliarhininae, because *Microplatymerus* has various typical features of the Cossoninae. Champion said that "*Microplatymerus* has the general facies of a small calandrid, and the broad flattened sterna and ascending mesothoracic epimera are suggestive of certain Madarides of the group Barina." To me, it has the facies of a cossonid and bears little resemblance to the calandrids, excepting perhaps in a very vague way to some *Sitophilus.* Moreover, the mesepimera are in no sense ascending as they are in the Baridinae. The mouthparts are typically cossonid, the metepisternal suture bears the nearly diagnostic row of specialized squamae ("sclerolepidia") of true cossonids, and the rectum has the sclerotized "loop" of the typical Cossoninae strongly formed, as my fig. 11 demonstrates. There is no doubt that *Microplatymerus* belongs to the Cossoninae.

There are various misleading or erroneous statements in the original description of the genus, and these require discussion. Champion said that the rostrum is short, but it is not unusually short. It is longer



Figs. 4–8. Sketches of details of a male *Microplatymerus lodoiceivorus* Champion. 4 and 5, dorsal and lateral views of aedeagus and associated parts; 6, outline of pygidium; 7, ninth sternite ("spiculum gastrale") with a separate sketch of its cephalic end in broad view at 8. All drawn to same scale.

than the head and one-half as long as the pronotum. The mandibles appear normal and not "scarcely visible" as stated by Champion. The submandibular, tooth-like projection of the gena is well developed. The postocular constriction is feeble and, as viewed from above, is contiguous with the posterior margins of the eyes; and, as viewed from the side, the median dorsal contour of head and rostrum is only gently depressed above the eyes. The antennae are inserted at only about one-half the length of an eye in front of the eyes, and the stout, strongly clavate scape extends slightly caudad of the lower posterior margin of the eyes when at rest. There is no suprascrobal sulcus ("secondary scrobe"), and the scrobe curves rapidly beneath the eye. The scrobe is not "shallow" as originally stated. The antennae are typically cossonid; the club is subequal in length to the preceding four funicular segments, it is only slightly broader than the fifth funicular segment, and its shiny basal segment is more than twice as long as the remainder of the club. The flat scutellum is not "very small" as originally described, but its breadth is subequal to the combined breadths of the



Figs. 9–16. Outline sketches of details of a female *Microplatymerus lodoiceivorus* Champion. 9, genitalia; 10, eighth sternite; 11, sclerotized "loop" of rectum (the male has a similarly formed loop); 12, pygidium; 13, ectal face of a metatibia, setae omitted; 14, metatarsus, setae omitted; 15, head and rostrum; 16, antenna, setae omitted. The scale line near 9 applies only to 9, that near 11 applies to 10, 11, and 12, that below 15 applies to 14, 15, and 16, and fig. 13 is drawn to a larger scale.

first intervals of the elytra (measured across the suture at about the basal one-fourth). The decurved, golden hairs on the dorsum are especially conspicuous on the elytra and most are directed obliquely mesad; the two lateral intervals have only small hairs and are mostly bare. Elytral stria 10 is complete to the apex. The flattened ventral surface, with the pro-, meso- and metasternum forming a continuous level, together with the short, broad form of the weevil no doubt reflect its mode of life in the palm fronds. Although the sutures between the procoxae and the mesocoxae can each be seen through the transluscent derm as a dark line, the sutures do not indent the

smooth surface. The procoxae are separated by twice the transverse diameter of a coxa, and the distance between them is only slightly less than the distance between the mesocoxae. The metacoxae are separated by only a little more than one-half the separation of the mesocoxae, and this is a rather unusual character. The mesepimera are not unusual as was suggested by Champion, and they do not extend dorsad to truncate the elytral humeri. The mesepimeral suture is mostly obliterated.

Champion misinterpreted the metepisternum when he said "metathoracic episterna rather broad, polished, fused with the sternum." He evidently confused the internal structure, which can be seen through the transluscent derm, instead of using the true metepisternal suture as the external boundary. The suture is clearly marked by the line of peculiarly modified squamae or "sclerolepidia" along it, and the exposed metepisternum is in truth narrow. It is very narrow cephalad, gradually broadens caudad and at its broadest point is only about as broad as the lateral elytral interval. The intercoxal piece of the first abdominal ventrite is gently arcuate; the combined medial lengths of ventrites one and two is greater than the length of the remainder of the venter (30:25), and ventrites two plus three are shorter than five (about 10:15) which is more than twice as broad as long (35:15 on the female measured).

It is confusingly stated in the generic description that the stout tibiae are "unarmed at the tips, angulate at the outer apical angle, rounded within," but it is said in the description of the species: "Intermediate and posterior tibiae each with two minute teeth at the outer apical angle." It is obvious that the tibial armature has been misinterpreted. The tibiae are short and stout and are adapted to the mode of life of the weevil on the host palm. The protibiae are quite cossonid-like, the uncus is distinct and strong, and there are two teeth on the outer tibial edge, one of which is evidently the mucro and the other a pre-mucral denticle on the angulation at the side of the tarsal articulating groove. The meso- and metatibiae each have four teeth on the anterior face of the apex, the bottom one of which appears to be the uncus, and what appears to be the mucro is present as another tooth at the lower apex of the tibia on the side opposite to the uncus. The three more dorsal teeth or spurs (see fig. 13) are unusual and recall similar spurs in the Scolytinae and as recently described by Kuschel for his group Araucariini [New Zealand Journal of Science 9(1):4, 1966]. It is possible that Champion did not have adequate optical equipment and hence could not see these small details. As noted by Champion, there are few external differences between the sexes of this weevil, and it is difficult to distinguish them.

The kind cooperation of the British Museum (Natural History) made possible the completion of this report.

CHRYBANEURA HARRISONI, A NEW GENUS AND SPECIES FROM CENTRAL AMERICA

(DIPTERA: CECIDOMYIIDAE)

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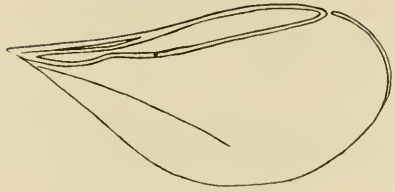
Specimens of this cecidomyiid were found among empty spider egg cases in Costa Rica and Panama by Dr. James O. Harrison of Mercer University, Macon, Georgia. The midges do not appear to be parasites of the spider eggs. The midges represent a new genus which belongs to the tribe Brachyneurini of the supertribe Oligotrophidi and resembles closely the genus *Brachyneura* Rondani in the form of the male and female genitalia and in the wing venation. The antennae, however, differ greatly from those of *Brachyneura* and resemble more closely those of typical Oligotrophidi. In *Chrybaneura*, the antennal flagellomeres have two longitudinal circumfila, many closely set setae ventrally and a few dorsally, and no scales; in *Brachyneura*, the flagellomeres have several very fine, wavy, longitudinal circumfila, do not possess setae, and have many long, narrow scales arranged in longitudinal rows.

Chrybaneura, n. gen.

Head with compound eyes broadly joined on vertex. Frontoclypeus and area behind eyes densely covered with scales. Antenna: scape short, narrowest at base; pedicel globular, as long as scape, both segments together subequal in length to first flagellomere; 10 flagellomeres, each with a long cylindrical node densely covered with minute setulae and a short, naked distal neck, the latter less than ¼ length of node, and shorter in the female; setae sparse dorsally, numerous and closely set ventrally; each node encircled by 2 transverse circumfila connected by 2 longitudinal strands. Palpus 3-segmented, each segment progressively longer than the preceding, cylindrical, longer than wide, tapering at ends, covered with scales, 4–5 setae present near apex of third segment, setae sparse elsewhere. Thorax: 2 dorsocentral rows of scales and setae on the mesoscutum, very wide at anterolateral angles, narrowing posteriorly, ending slightly anterior to the scutellum; 2 lateral scutal rows of setae beginning behind prescutal suture and ending above the wing bases; setae present on disc of scutellum and on anepimeron. Wing (fig. 1): costa interrupted at juncture with R_5 proximal to wing apex; R_1 short, less than ½ wing length; R_5 arched forward approximately ⅓ distance from base, a sensorium present distal to arch; Cu simple, not extending to edge of wing; entire wing covered with scales which are denser on veins than on membrane. Legs: 5 tarsomeres, first shorter than second; covered with scales; tarsal claws strongly curved, with well-developed teeth; empodium and pulvilli short. Male postabdomen: tenth tergum broad, bilobed, the lobes roughly triangular; tenth sternum about as long, but narrower than the tergum, bilobed, the lobes narrow and rounded at apex; basimere short, stout, with many setae;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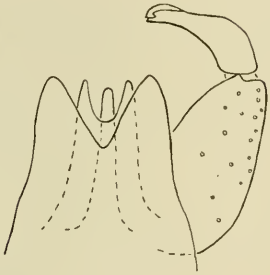
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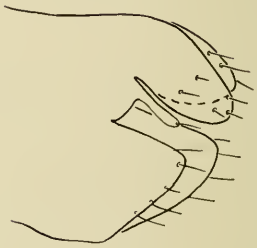
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Figs. 1–6, *Chrybaneura harrisoni*, n. sp.: 1, wing (40X); 2, fifth flagellomere, ♂, dorsal view (225X); 3, same, ventral view (225X); 4, fifth flagellomere, ♀, dorsal view (225X); 5, postabdomen, ♂, dorsal view (225X); 6, postabdomen, ♀, lateral view (250X).

claspettes absent; distimere short, constricted beyond the middle, and toothed at apex. Female genitalia: non-protrusible; 2 dorsolateral cerci present; a long median narrow lamella present below cerci; eighth sternum divided into 2 roughly triangular posteriorly projecting ventrolateral lobes.

Type-species, *Chrybaneura harrisoni* n. sp.

Chrybaneura harrisoni, n. sp.

Antenna: length third male flagellomere (figs. 2–3), 0.06 mm, the stem ¼ length of node; length third female flagellomere (fig. 4), 0.05 mm, the stem ⅛ length of node; 2 transverse circumfila near ends of each flagellomere, arching toward middle to meet the 2 longitudinal connectives. Length of palpal segments I–III (in mm): I, 0.012–0.013; II, 0.019–0.021; III, 0.029–0.032. Chaetotaxy: dorsocentral setae, 23–27; scutal, 12–17; scutellar, 8–10; anepimeral, 7–9. Wing length, 0.53–0.83 mm. Length femur: tibia: tarsus approximately 9:1:1. Percent length of each tarsomere to total length of tarsus, from I to V: I, 14; II, 31; III, 20; IV, 17; V, 18. Male postabdomen (fig. 5) tenth tergum wide, broadly and triangularly emarginate, with several setae along lateral edges; tenth sternum as long as tergum, bilobed with emargination not as deep as that of tergum, and rounded, the resulting lobes narrow, each with a seta at apex; aedeagus narrow, as long as tenth segment; basimere stout, unlobed, with several setae along length; distimere broad at base, narrowing at middle, ending in a sclerotized tooth.

Female postabdomen (fig. 6): cerci 0.07–0.08 mm in length, each with several setae; lower lamella, long, narrow, 0.035 mm in length; triangular lobes of eighth sternum prolonged posteriorly almost as far as cerci.

Immature stages unknown.

Material examined: Holotype (on slide): ♂, Panama: Changuinola, No. 358, VII–15–1965, from old egg shells of parasitized spider eggs [parasitized by Hymenoptera], coll. James O. Harrison, USNM 69510. Paratypes: 10 ♂♂, 9 ♀♀, same data as holotype; 4 ♂♂, 7 ♀♀, Costa Rica : Ciudad Quesada, No. 385, VII–15–1966, from spider egg cases, coll. James O. Harrison. All types deposited in U. S. National Museum.

A NEW GENUS AND SPECIES OF DELTOCEPHALINAE FROM PUERTO RICO

(Homoptera: Cicadellidae)

J. Maldonado Capriles, *Department of Biology, Cayey Regional College, University of Puerto Rico, Cayey, Puerto Rico 00633*

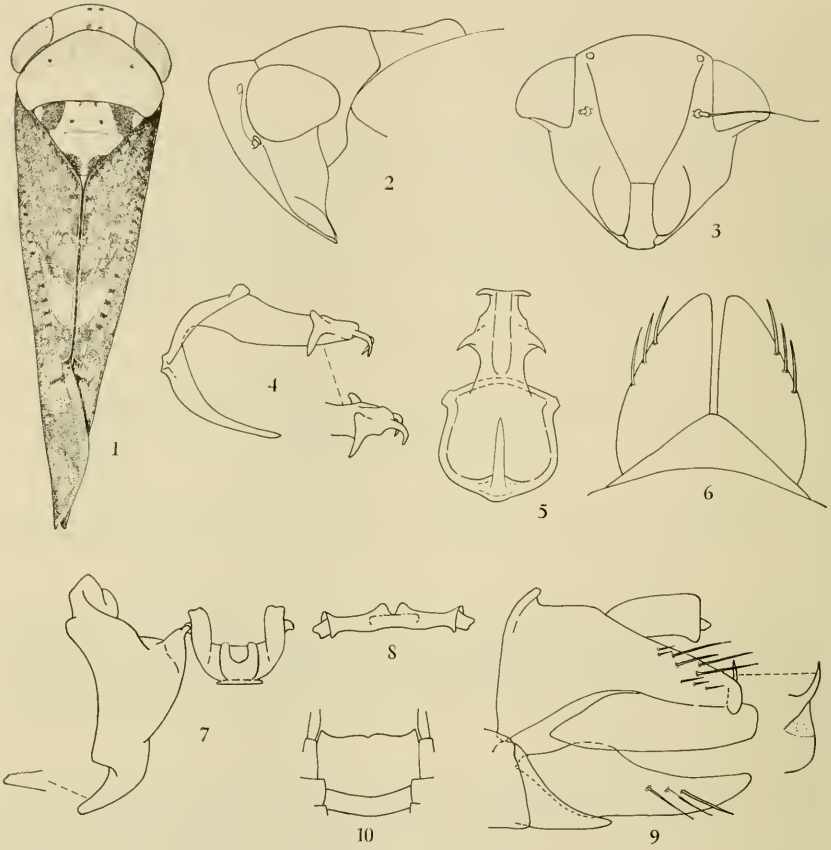
A new genus and species of leafhopper from the mountains of Puerto Rico is herein described. All efforts have failed to collect this species by sweeping from the ground or low level vegetation around the light traps in which all specimens have been caught. This seems to be a tree-dwelling species.

I have great pleasure in dedicating this genus to my friend, Dr. James P. Kramer, of the U. S. Department of Agriculture, Washington, D. C., for his many contributions to the knowledge of the Cicadellidae.

The types are deposited in the U. S. National Museum and in my collection. In the measurements that follow, 10 micrometer units correspond to 0.075 mm. To establish the systematic position of this new genus I have followed R. Linnavuori's "Revision of the Neotropical Deltocephalinae and some related Subfamilies," Annales Zoologici Societatis Zoologicae Botanicae Fennicae "Vanamo," Vol. 20, No. 1, 1959.

Krameraxus, n. gen.

Cicadellidae, Deltocephalinae, Euscelini. Relatively robust, not flattened body, about 5.9 mm long. Ocelli on anterior margin of crown contiguous to eyes. Episternum concealed. Dorsum without rough circular pits. Face flat, not hairy; frontoclypeus broadening upwards. Gena not visible from above. Crown very slightly longer medianly than next to eyes, nearly flat, smooth, rounded to face at anterior margin. Pronotum inconspicuously finely transversely rugose; narrower than head across eyes. Scutellum smooth, about 1.4 times as broad as long, apical half raised. Forewings well developed, with numerous false veins or broken pigmented lines, small irregular brownish and subcircular or subsquare whitish



Figs. 1–10, *Krameraxus leucornatus*, n. gen. and n. sp.: 1, habitus; 2, head and part of thorax in lateral view, ♂; 3, face, ♂; 4, aedeagus in lateral view; 5, aedeagus in ventro-caudal view; 6, valve and ♂ plates; 7, style and connective in dorsal view; 8, connective in caudal view; 9, ♂ genital capsule in lateral view; 10, ♀ seventh sternum and adjacent segments.

or grayish areas; 4 apical cells, the fifth missing; apparently 3 subapicals, the crossvein closing the inner missing or perhaps obscured by the false veins. Face, crown, pronotum, and scutellum mostly yellowish-white or yellowish with a grayish sordid appearance and ornamented with pale or dark brown. Male genitalia: pygofer with membranous lateral fold and macrosetae. Plates triangular and with macrosetae. Style with a short curved apophysis and broad plate-like basal part. Connective U-shaped, probably a modification of the Y-shaped type (fig. 7), flattened. Valve and genital plate articulated, not fused. Aedeagus symmetrical, horizontal, spined apically, arising from a disc-shaped unsclerotized structure, a strong spine pointing caudad on middle of lower edge of disc-shaped structure.

Type of genus: *Krameraxus leucornatus*, n. sp.

Krameraxus leucornatus, n. sp.

(Figs. 1–10)

Characterized by its medium size, wedge-shaped body, and highly contrasting anterior yellowish parts with the brown forewings.

Female—face, crown, pronotum, and scutellum mostly yellowish-white; eyes brownish or yellowish, crown with 2 brown anterior spots and two posterior dashes near median line; pronotum with a brown spot on disc in line with each inner margin of eye, pale brown irregular areas near anterior margin as illustrated; scutellum with a triangular brown area near each anterior angle, a small semicircular brown area on each side near apex, 2 brown spots on disc anterior to brown transverse suture, 2 very small brownish areas anteriorly near median line (fig. 1). A dark spot below each ocellus. Anteclypeus yellowish-white on basal half. Apical half of anteclypeus, lorae, and genae heavily mottled with brown. Forewing mostly polished brown, with many darker spots, brown transverse false veins and ramose lines, with many subcircular or subsquare grayish areas; costal area yellowish and spotted with brown on middle third, first and last third brownish with lighter and darker brown spots, a hyaline area above the yellowish section of costa; inner margin of and a large round area near apex of clavus whitish. Pro- and mesofemur brown with yellowish irregular annuli; metafemur and tibiae stramineous with brown spots, especially along strongly spined margins; spines stramineous. Abdominal sterna grayish with pale brown margins. Last abdominal segment on middle of hind margin brown; pygofer mostly brown, yellowish near base of ovipositor; ovipositor brown at midlength, light colored basally and apically.

Crown slightly longer near middle than near eye (3.7:3.2), slightly less than 4 times as wide as long near eyes (12:3.2). Head wider across eyes than pronotum (25:22). Pronotum twice as wide as long (22:11). Scutellum about 1.5 times as wide as long (17:11). Last abdominal sternum as in fig. 10; pygofers with macrosetae. Length 5.9 mm.

Male—general coloration much as in female. Yellow of head and thorax with a brownish tinge, not so bright as in female; genal area lighter, with very scarce pale brown mottling; large whitish spot near apex of clavus present or with a squarish gray area in its place. Costal margin without yellowish middle area. Crown slightly longer at middle than near eye (3.1:3.0), slightly less than 4 times as wide as long near eye (11:3.0). Head wider across eyes than pronotum (23:20). Pronotum twice as wide as long (20:10). Scutellum about 1.3 times as wide as long (16:13). Male genitalia as illustrated. Length 5.2 mm.

This genus runs to the Euscelini in Linnavuori's key to the tribes of the Deltocephalinae. In his key to the genera of Euscelini, p. 153, it runs to couplet 11 if the connective is considered as of the Y-type and whether considered to have two or three subapicals. It differs strikingly from the keyed genera.

Holotype, male, from El Verde Experimental Forest Station, near El Yunque, Puerto Rico, June 1967, in a light trap, collected by the author, USNM 69658. Allotype, female, same data, in the USNM. Paratypes, four: two same data as holotype, and two from Maricao State Forest, taken in a light trap operated in the Fish Hatchery, in the author's collection.

THE GENUS PASSALOBIA LOMBARDINI, 1926, WITH DESCRIPTION OF A NEW SPECIES

(ACARINA: DIARTHROPHALLIDAE)[1]

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The genus *Passalobia* was erected by Lombardini (1926) for a new species, *Passalobia quadricaudata*, taken from under the elytra of a passalid beetle from Brazil. Lombardini (1938a, 1938b, 1951) later added the following species, all based on nymphs, to this genus: *duodecimpilosa*, 1938, *major*, 1938, and *peritrematica*, 1951. Womersley (1961) moved *duodecimpilosa* to *Diarthrophallus* Trägårdh and erected a new genus, *Passalana*, for *peritrematica* leaving only two species, *quadricaudata* and *major*—both from passalid beetles from Brazil—in *Passalobia*. In this paper we are describing a new species of *Passalobia* taken from a small number of alcohol preserved passalid beetles from Costa Rica.

Passalobia Lombardini, 1926

Lombardini, G. 1926. Boll. Soc. Entom. Ital. 63: 158, figs. 1–2.
Womersley, H. 1961. Trans. Roy. Soc. S. Australia 84: 35.

Womersley (1961) redescribed this genus and included a key to the species. The genus is distinct in having the tectum helmetlike with an apical spike, dorsum with one (subposterior) pair of long simple setae and the elongate body slightly constricted behind coxae IV.

Passalobia dubinerae, n. sp.
(Fig. 1A–K)

The female is distinct from *quadricaudata*, the only known female, in that the perigenital ring is triangular in shape and completely posterior to coxae IV whereas in *quadricaudata* the perigenital ring is oval and extends to the middle of coxae II. The separation of these adults from *major* must await description of the adult of *major*. Although the nymphal stage described for *major* and *quadricaudata* was not indicated, it appears to be the deutonymph for both. If so, the following combination of characters are distinctive for the deutonymph of the new species: Idiosoma approximately three times as long as area from coxae I to IV; para-anal setae shorter than posterior dorsal setae; dorsal setae arising from the integument posterior to the dorsal plate.

FEMALE. Idiosoma elongate, 626 μ long, constricted behind legs IV, 193 μ at greatest width anterior to coxae IV, 101 μ at narrowest part of constriction, 123 μ at greatest width posterior to constriction (measurements are the average

[1] University of Georgia College of Agriculture Experiment Station, Journal Series Paper No. 110, College Station, Athens. Partially supported by the National Science Foundation, Grant No. GB-3414.
[2] Associate Professor and Graduate Student, respectively.

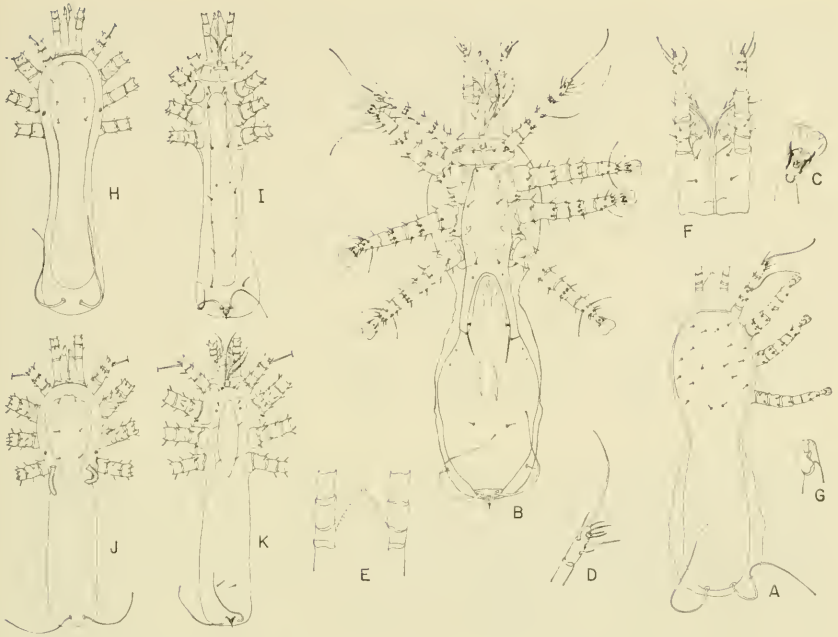

Fig. 1. *Passalobia dubinerae* n. sp. Female: A, dorsum; B, venter; C, ventral view of caruncle III; D, dorsal view of tarsus I; E, tectum; F, ventral view of gnathosoma; G, chelicera. Deutonymph: H, dorsum; I, venter. Protonymph: J, dorsum; K, venter.

of 10 specimens). *Dorsum* (fig. 1A). A single plate covering most of dorsum, plate constricted behind legs IV, posterior to constriction widens slightly; integument visible around all margins of plate; 1 pair of long simple forwardly curving setae arising from posterior margin of plate, other setae on plate consisting of 9 pairs of very minute simple setae (setae smaller in relation to body size than shown in fig. 1A) in area above coxae; 1 pair of pores near posterior margin of plate; plate without reticulations. *Venter* (fig. 1B). Coxae I forming a V medially, the anterior margins not touching; 1 pair of pores in integument anterior to base of coxae. Sternal, endopodal, metasternal and ventral plates coalesced, 550 μ long, 88 μ wide at level of coxa IV, expanding behind genital opening to 174 μ wide; extending posteriorly to and in contact with anal plate; coalesced plate bearing 3 pairs of pores and 5 pairs of small simple setae; location of pores—2 pairs just posterior to genital opening, 1 pair at anterior level of genital opening, 1 pair between coxae II and III, 1 pair at posterior margin of coxae IV, 1 pair midway between genital and anal opening and 1 pair at posterior margin of genital opening. Anal plate small, triangular shaped; separated from genital plate by a suture; anal setae simple, para-anals long, capitate at tip, post-anal no longer than length of anal opening. Genital opening surrounded laterally and anteriorly by perigenital ring; anterior margin of ring well posterior to coxae IV; genital plate tongue-shaped, bearing striaelike marks medially. Integument visible lateral

Table 1. Leg chaetotaxic formulae of deutonymph-female of *Passalobia dubinerae* n.sp. Total number of setae only given for tarsi.

Leg	Segment					
	Coxa	Trochanter	Femur	Genu	Tibia	Tarsus
I	$\frac{0}{0-1}$ $\frac{}{2}$	$\frac{00}{1-1}$ $\frac{}{00}$	$\frac{21}{1-1}$ $\frac{}{11}$	$\frac{11}{1-1}$ $\frac{}{00}$	$\frac{01}{1-1}$ $\frac{}{11}$	5
II	$\frac{0}{0-0}$ $\frac{}{1}$	$\frac{00}{1-1}$ $\frac{}{11}$	$\frac{22}{1-1}$ $\frac{}{11}$	$\frac{11}{1-1}$ $\frac{}{00}$	$\frac{01}{1-1}$ $\frac{}{11}$	11
III	$\frac{0}{0-0}$ $\frac{}{1}$	$\frac{10}{1-1^{A}}$ $\frac{}{10}$	$\frac{21}{1-1^{C}}$ $\frac{}{11}$	$\frac{11}{1-1}$ $\frac{}{00}$	$\frac{01}{1-1}$ $\frac{}{11}$	11
IV	$\frac{0}{0-0}$ $\frac{}{0}$	$\frac{10}{1-1^{B}}$ $\frac{}{10}$	$\frac{21}{1-1^{D}}$ $\frac{}{11}$	$\frac{11}{1-1}$ $\frac{}{00}$	$\frac{01}{1-1}$ $\frac{}{11}$	11

Protonymph: $^{A}\,1\frac{10}{10}0$; $^{B}\,1\frac{10}{10}0$; $^{C}\,1\frac{21}{10}1$; $^{D}\,1\frac{20}{00}1$.

of plate behind coxae IV and bearing 1 pair of simple, short setae near posterior of body. Peritreme dorsolaterally, at level of coxa III, approximately half width of coxa in length, no peritremal plate seen. Tritosternum bearing 2 spined lacinae; a pair of simple setae flanking base. *Legs.* Setae simple, all short except for a pair of longer setae on tarsi II–IV and a long whiplike seta on dorsum of genu I and tip of tarsi I. Chaetotaxy formulae given in Table 1. Pretarsi II–IV each bearing a large padlike caruncle and a pair of sclerotized T-shaped claws (fig. 1C), each claw attached to the caruncle by the middle bar of the T with the cross bar, which runs parallel to the caruncle, terminating at each end in a sharply pointed claw; distal to the attachment of each claw the caruncle bears a thickened padlike, claw-shaped structure. Posterodorsally tarsus 1 bears a subterminal 3-tined clawlike structure (fig. 1D). *Gnathosoma* (fig. 1E–G). Tectum (fig. 1E) with a ventral groove—appearing as a longitudinal strip; margin smooth. Internal mali long, extending to middle of tibia, bearing centrally a thickened supporting structure; lateral and medial of supporting structure mali is membranous, lateral margin scalloped, medial margin bearing 2 spinelike projections. Venter of gnathosoma bearing only 3 pairs of setae, relative lengths as shown, internal posterior rostral setae absent; deutosternal groove present but without teeth. Palpal setae simple; all short except for 2 longer setae on distal margin of tibia and 1 on tarsus; tarsus bearing a thickened spinelike terminal setae. Chelicerae chelate, well sclerotized; movable digit with 1 strong tooth, fixed digit with 2 teeth (fig. 1G).

DEUTONYMPH. Idiosoma 540 μ long, 115 μ wide (average of 2 specimens); constricted behind coxae IV. *Dorsum* (fig. 1H). Single dorsal plate 457 μ long, following general contour of body, constricting to 48 μ and expanding posterior of constriction to 90 μ; not extending to margins of idiosoma nor to posterior margin of body; 4–5 pairs of minute setae (relative size smaller than illustrated) above coxal region; integument bearing 1 pair of long simple setae posterior of dorsal plate. Stigmata dorsolateral above coxae III, visible dorsally. *Venter* (fig. 1I). Coxae I meeting medially. Single elongate plate 403 μ long, 48 μ at greatest width behind coxae IV, extending posteriorly almost to anal plate; bearing 4 pairs of setae and 2 pairs of pores positioned as shown; 2 pairs of setae—1 pair anterior

and I posterior—off plate; relative lengths of setae as shown; 1 pair large pores in integument medial of coxae II. Anal plate rounded; anal setae simple, para-anals long, length of post-anal about equal to length of anal opening. Tritosternum as in female. *Legs.* Chaetotaxy as in female. Length of legs II–IV: II, 195 μ; III, 183 μ; IV, 185 μ. *Gnathosoma* of same general characteristics as described for female.

PROTONYMPH. Idiosoma 453 μ long (average of 5 specimens); weakly constricted behind coxae IV. *Dorsum* (fig. 1J). Dorsal podosomal plate only; plate 168 μ long, 93 μ wide; shape as shown; integument visible around margin of plate; bearing 4 pairs of minute setae (relative size of setae much smaller in relation to body than shown). Posteriorly idiosoma bearing 1 pair of long simple setae. A pair of peritremes (?) arising from the dorsum near the posterior margin of the dorsal plate (these structures are free of the body and appear to connect to the stigmata which are dorsolateral in position; similar structures were not seen in the deutonymph or female.) *Venter* (fig. 1K). Plate 133 μ long, 35 μ at greatest width; bearing 2 pairs small simple setae positioned as shown. Integument bearing 1 pair small setae just posterior to coxae I and a slightly larger pair near posterior of body; 2 pairs of pores—1 pair anterior to coxae I, second pair at level of coxae II. Anal plate not well sclerotized; bearing 3 simple setae, para-anals long; length of post-anal seta about equal to length of anal opening. A pair of simple setae at base of tritosternum; lacinae as in female. *Legs.* Chaetotaxic deviations from adult discussed below; lengths of legs II–IV as follows: II, 180 μ; III, 167 μ; IV, 155 μ. *Gnathosoma.* Hypostomal process, corniculi and ventral hypostomal setae of general facies of female.

Male unknown.

LEG CHAETOTAXY. The chaetotaxic formula following Evans (1963) is given in Table 1 for the deutonymph-female. Of particular interest, compared to other diarthrophallids and mesostigmatic mites, is the loss of the posterior seta on coxae II, III, and IV.

The protonymphal leg chaetotaxy is the same as that of the deutonymph-female except for the absence of the following setae: trochanter III and IV—pl of each segment missing; femur III—pv_1 missing; femur IV–av_1, ad_1 and pv_1 missing.

Described from a series of 10 females, 2 deutonymphs and 5 protonymphs. Holotype (female) data: San Vito, Costa Rica; 11–II–1965; M. V. Truitt, coll.; from passalid beetle, genus *Publius*. All females, deutonymphs and 3 protonymphs with same data. Two protonymphs with same data except collected from passalid beetle of genus *Passalus*. Holotype, three female paratypes, one deutonymph and 2 protonymphs deposited in U. S. National Museum, Washington, D. C. Remaining material in collection of Department of Entomology, University of Georgia, Athens, Georgia.

Remarks. The free peritremelike structure of the protonymph is unusual. Free peritremes occur in *Passalana peritrematica* (Lamb.) which is known only from the nymphal stage. Neither Lombardini nor Womersley indicated which nymphal stage was represented. From the ventral chaetotaxy it appears likely the specimen was a protonymph. The description of additional species of *Passalobia* would

answer the question of whether all protonymphs of this genus have similar peritremelike structures and, if so, should *Passalana* retain separate generic standing.

ACKNOWLEDGMENTS

We would like to express our appreciation to Mrs. Virginia Truitt Mullen, Department of Entomology, University of Georgia, for the passalid beetles from which these mites were taken and to Dr. O. L. Cartwright, U. S. National Museum, Washington, D. C., for determinations of the beetles.

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NEW GENERA AND SPECIES OF NEOTROPICAL BLISSINAE (HEMIPTERA: LYGAEIDAE)[1]

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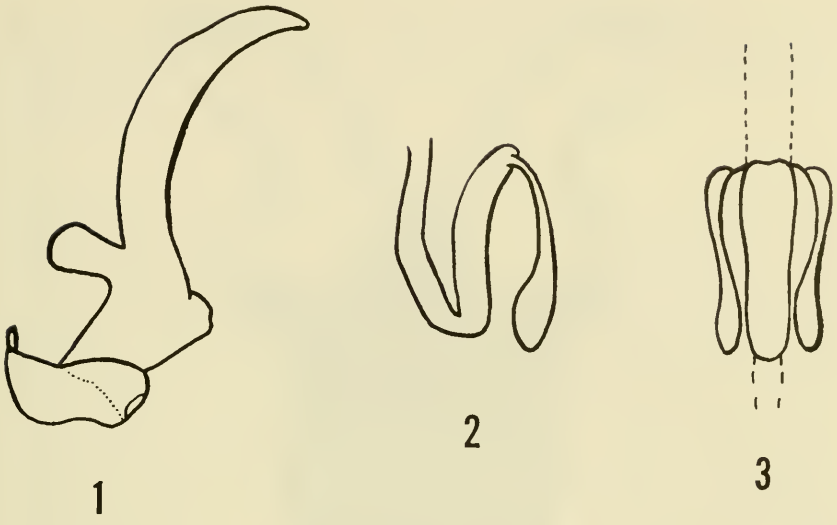
During the course of recent revisional work on the Chinch Bug subfamily Blissinae we have described and treated three new genera, *Patritiodemus* (Slater and Ahmad, 1968), *Praetorblissus* (Slater, 1966) and *Reticulatodemus* (Slater and Wilcox, 1966). In the present paper we describe an additional new species in each of these genera from specimens which have become available since the original publication of the new genera, describe an additional South American genus *Caveloblissus,* and comment upon the hitherto unknown macropterous form of *Heteroblissus anomilis* Barber.

Caveloblissus, n. gen.

Body subelongate, robust, nearly parallel sided; head and anterior pronotal lobe above strongly shining, posterior pronotal lobe from anterior margin of transverse impression to and including entire humeral area and scutellum dull pruinose, dividing line on pronotum between anterior shining and posterior pruinose areas

[1] This work was supported by a grant in aid from the National Science Foundation.



Figs. 1–3, *Caveloblissus americanus,* n. sp.: 1, clasper; 2 and 3, sperm reservoir.

sharp and straight transversely across pronotum; scutellum lacking shining areas even on median elevation; antennae relatively elongate with segments 2 and 3 almost completely terete, 2nd segment slightly enlarged at distal end, 4th segment strongly fusiform; hemelytra with apical corial margin concave basally, lateral corial margins conspicuously sinuate, membrane subhyaline, differing markedly in thickness and texture from clavus and corium; all femora moderately incrassate, mutic; fore coxal cavities open; head and thorax completely pruinose below; mesosternum bearing a deep median longitudinal furrow; metathoracic scent gland orifice small, rounded, auricular; fore tibiae linear, lacking a series of teeth, and completely non-fossorial, 1st and 2nd tarsal segments of nearly equal length, basal segment not enlarged and broadened; antenniferous tubercles bluntly truncate; claspers (fig. 1) short and stout, inner lobe set relatively far from base, sperm reservoir (figs. 2, 3) consisting of a central sclerotized rod and a pair of slender, elongate lobed lateral "wings."

Type-species: *Caveloblissus americanus,* n. sp.

This new genus is closely related to *Neoblissus* Bergroth and to the other Western Hemisphere species such as *leucopterus* (Say) and its allies, currently placed in the genus *Blissus* Burm. The genus is separable, however, by virtue of the shining head and anterior pronotal lobe. In *Neoblissus* and Western Hemisphere "Blissus" species the head and entire pronotum are completely pruinose. It is interesting that this sharp division of the pronotum into shining and pruinose areas parallels that of *Cavelerius* Distant (Oriental) and *Praeblissus* Barber (W. Hemisphere). This relationship, however, seems to us to be the result of independent specialization from a more generalized

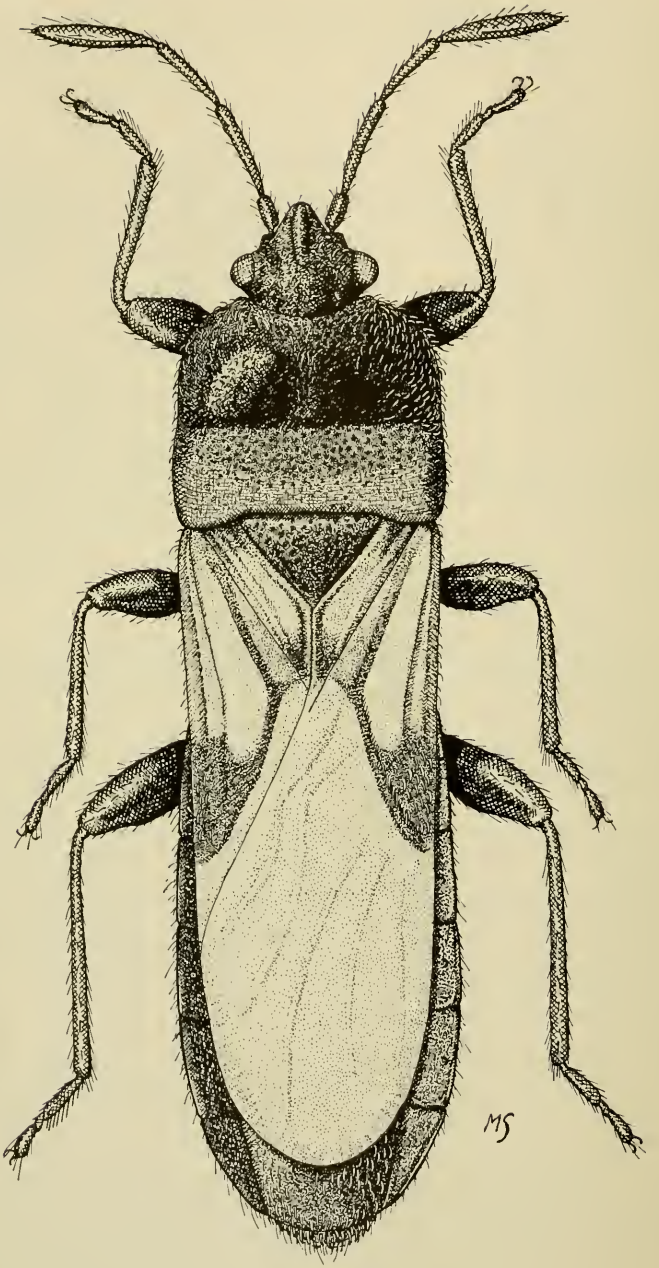


Fig. 4, *Caveloblissus americanus,* n. sp., dorsal view.

ancestor and not to indicate direct phylogenetic derivation of the three taxa. The evolutionary relationships of this genus will be more fully discussed in a subsequent paper on generic relationships in the subfamily.

Caveloblissus americanus, n. sp.
(Fig. 4)

Head, pronotum and scutellum black, pronotum becoming bright reddish brown across humeral area, tylus dark red-brown on anterior half; hemelytra sordid white, membrane subhyaline, clavus dark red-brown on basal third, corium with a very large dark red-brown apical patch, this dark coloration extending along entire apical corial margin and midway to base of cubital vein, an additional rectangular brown patch at inner angle of apical corial margin extending ⅓ way from apical margin inward, in contact both with cubital vein and claval suture and strongly contrasting with the pale flavescent corium adjacent; abdomen uniformly bright red-brown; all femora bright castaneous, tibiae and tarsi flavescent with a basal and apical brown band around tibiae, somewhat suffused with brown on fore tibiae; antennae reddish brown with proximal ⅔ of 2nd segment a light tan, apex of 3rd tarsal segment dark brown, strongly contrasting with flavescent color of preceding tarsal segments; head somewhat rugulose; pronotum and scutellum minutely indistinctly punctate; clothed above and below with a rather thick covering of decumbent sericeous hairs.

Head non-declivent, conspicuously convex across vertex, tylus subacuminate, extending midway to distal end of 1st antennal segment, eyes somewhat produced laterally, set very slightly away from antero-lateral pronotal angles, length head .46 mm, width head .67 mm, interocular space .40 mm; pronotum moderately convex, lateral margins nearly straight from base to central area of calli, then strongly mesally arcuately curved to anterior margin, posterior margin nearly straight across base of scutellum with very slightly produced posteriorly directed lobes laterad of scutellar base, transverse impression complete, shallow, width across humeri equal to width across calli, length pronotum .87 mm, width pronotum 1.22 mm; scutellum with a low inconspicuous median elevation on distal ⅔, length scutellum .40 mm, width scutellum .54 mm; hemelytra with lateral corial margins sinuately concave, membrane extending midway to posterior margin of 7th abdominal tergum, leaving abdominal connexiva exposed throughout; distance apex clavus—apex corium .76 mm, distance apex corium—apex abdomen 1.63 mm; labium relatively elongate, extending well onto mesosternum, distal end of 1st segment approaching or attaining base of head, 2nd segment attaining or nearly attaining base of prosternum, length labial segments (male paratype) I .33 mm, II .40 mm, III .36 mm, IV .53 mm, length antennal segments I .15 mm, II .40 mm, III .34 mm, IV .55 mm; total length 4.68 mm.

Holotype: Male. BRAZIL: Porto Alegre 25-VII-945 "on *Bambusa* sp." (R. Gomex Costa). In La Plata Museum.

Paratypes: BRAZIL: 1 female, same data as holotype; 1 male, 1 female, Sao Leopoldo (J. W. Stahl); 1 male Corumba. PARAGUAY: 1 female, Asuncion 4.X.16 (Vezenyi). In Hungarian National Museum, Stockholm Museum, U. S. National Museum (Drake coll.), and J. A. Slater collections.

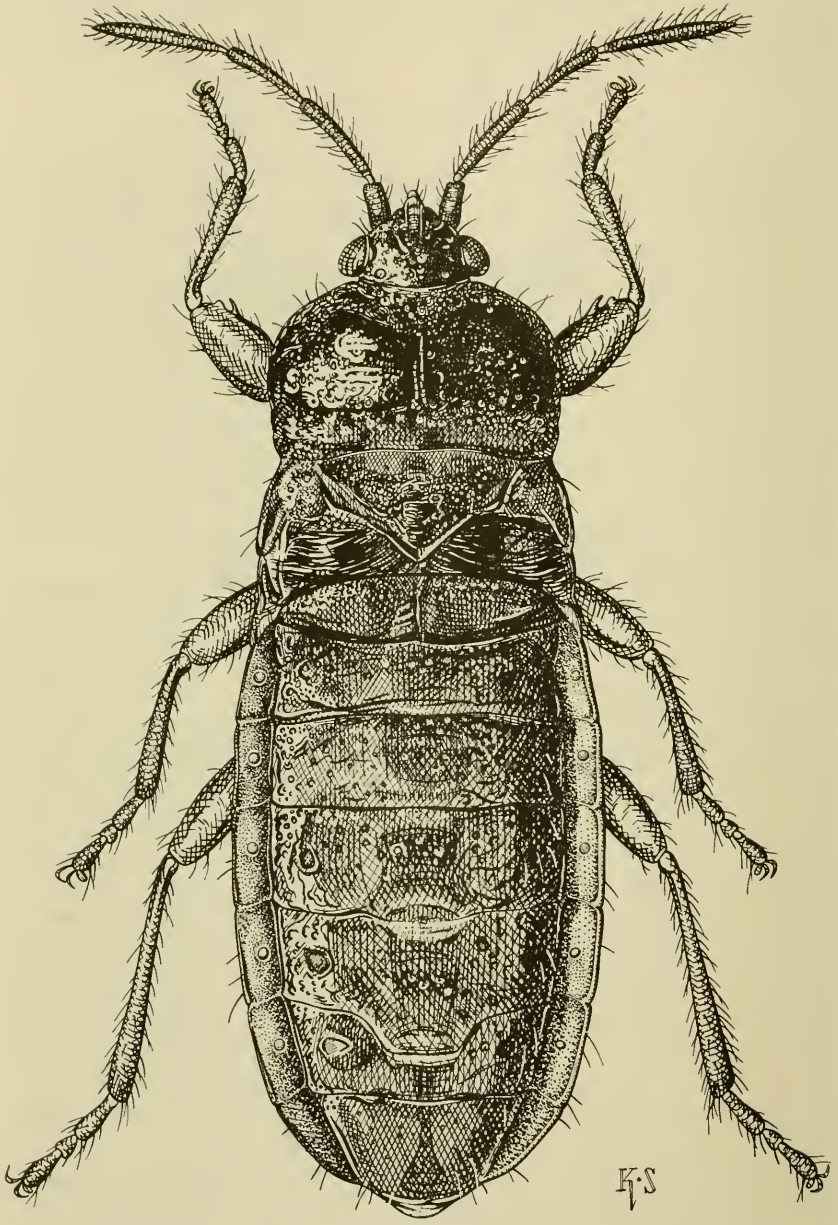


Fig. 5, *Praetorblissus gradus,* n. sp., dorsal view.

Praetorblissus gradus, n. sp.
(Fig. 5)

General coloration a nearly uniform dark castaneous red-brown becoming fuscous on antennae, scutellum, anterior pronotal lobe in region of calli and exposed metanotum; legs and connexivum a contrastingly pale yellowish ochraceous; body in large part glabrous or with only a few scattered hairs, more numerous along lateral margins of pronotum; head and anterior pronotal lobe smooth and impunctate, or nearly so, extreme anterior area of pronotum with numerous large, coarse punctures placed in a collar-like position, posterior pronotal lobe coarsely and deeply punctate, scutellum and abdominal terga with numerous small scattered punctures.

Head non-declivent, shallowly and irregularly rugulose, moderately convex, eyes sessile or nearly so, set very slightly away from antero-lateral pronotal angles, tylus extending to distal ⅓ of 1st antennal segment, length head .62 mm, width head .91 mm, interocular space .61 mm; pronotum prominently arcuate, the lateral margins nearly straight or even slightly expanded from humeral angles to area of calli, then sharply and convexly narrowing to anterior margin, calli strongly convex to form a depressed median furrow on anterior lobe, posterior margin nearly straight, at most very slightly concave, transverse impression obsolete, posterior lobe only ½ or slightly more than ½ length of anterior lobe, length pronotum 1.10 mm, width pronotum 1.67 mm; scutellum elevated and convex on basal half, with a low broad median elevation distally, length scutellum .61 mm, width scutellum 1.18 mm; hemelytra reduced to extremely tiny undifferentiated pads, extending along lateral margin only midway to posterior margin of metanotum, median angle reaching only midway to apex of scutellum, apical margin strongly concave, length wing pad .99 mm; metanotum completely exposed, coarsely and deeply transversely grooved; abdomen elongately ovoid, suture between abdominal terga 5 and 6 deeply curved caudad mesally, length abdomen 3.45 mm; metathoracic scent gland orifice broad, rounded distally, projected anteriorly as a broad finger-like process (fig. 6); fore femora strongly incrassate, armed below on distal third of each ventral surface with a large elongate sharp spine, additional short inconspicuous spines present distally, middle and hind femora mutic; labium slightly exceeding fore coxae, length labial segments I .42 mm, II .46 mm, III .42 mm, IV .34 mm. (approx.); antennae slender, terete, 4th segment very narrowly fusiform, length antennal segments I .23 mm, II .65 mm, III .65 mm, IV .84 mm; total length 4.68 mm.

Holotype: Male. PERU: Utcuyacu and Agua Dulce, Prov. of Tarma, Dept. of Junin III-1948 (F. Woytkowski) (donor Wm. Procter). In American Museum of Natural History.

Paratypes: 2 males, same data as holotype. 1 male, BOLIVIA: Cochabamba (Germain) (coll. Noualhier 1898). In Paris Museum, American Museum of Natural History and J. A. Slater collections.

This is the second species known in the genus *Praetorblissus* and it differs strikingly from the type species, *gigas* Slater. *P. gradus* is only about half the size of *gigas* and importantly it lacks spines on the middle and hind femora. This character is important in the phylogeny of the Blissinae and is often used to establish generic entities. How-

ever, in the present case it appears undesirable to place this new species in a distinct genus since it is so obviously closely related to the type species of *Praetorblissus* and the loss of spines on the middle and hind femora represents an evolutionary advance in the phylogeny of the genus which would be masked were we to not recognize the close relationship of these two species in every other respect. The condition of the head, pronotum, type of extreme wing brachyptery, shape of scent gland orifice (fig. 6), body texture, open coxal cavities, and even spines on the fore femur indicate the very close relationship between *gigas* and *gradus*, and there is no doubt that the two are very closely related to one another, *gradus* being the more recently evolved of the two. Slater (1966) has previously remarked on the possible relationships between *Praetorblissus* and *Heteroblissus* Barber. This new species makes this relationship even more compelling since *gradus* is about the size of *Heteroblissus anomilis* Barb., and both lack spines on the middle and hind femora. Nevertheless, *gradus* is not at all intermediate between *gigas* and *Heteroblissus anomilis*, being a typical *Praetorblissus* in all respects except the condition of the femoral spines mentioned above.

Heteroblissus anomilis Barber

Heteroblissus anomilis Barber, 1954, Rev. Brasil Biol. 14(2):221–3.
Heteroblissus anomilis: Ashlock and Lattin, 1963, Ann. Ent. Soc. Amer. 56: 694–703.
Heteroblissus anomilis: Slater, 1966, Univ. Conn. Occ. Pap., Biol. Sci. Ser. 1(1): 3–11.

This species, the only representative of the genus, has previously been known only from extremely micropterous specimens. Since the nature of the front wings is important in establishing generic relationships it is pleasing to report the presence of two fully macropterous females in the Leningrad Museum from Misiones, Loreto, Argentina.

The hemelytron of these macropters has the clavus and corium heavily sclerotized, strongly contrasting with the thin semi-hyaline membrane, the apical corial margin concave basally, but straight for a considerable portion of its length. The clavus bears a row of punctures along its inner margin and on either side of a raised calloused line near the claval suture. The corium bears a row of punctures on either side of the cubital vein and mesad of the strongly raised radial vein. The corium on the lateral half is of a contrasting thickness and composition to the inner half. The entire dorsal as well as the ventral surface is subshining, completely devoid of pruinose areas. The membrane is broadly rounded and extends distad almost to the posterior margin of the sixth abdominal tergum. The genus is an interesting one in that it possesses what appears to be a stridulatory area on the abdominal sterna (see Ashlock and Lattin, *ibid.*).

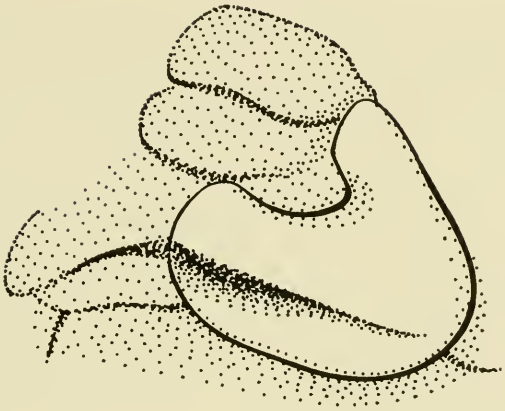


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Fig. 6, *Praetorblissus gradus,* n. sp., scent gland orifice.

As is so frequently the case with species exhibiting wing polymorphism, the pronotal shape of the macropterous form is quite unlike that of the brachypterous specimens. In the former the pronotum is more elongate, broader across the humeri than across the calli and with at most a lateral trace of an obsolete transverse impression.

H. anomilis was originally described from southern Brazil. In addition to the Loreto locality mentioned above we have examined material from San Antonio in Misiones, Argentina.

Reticulatodemus orbiculoides, n. sp.

Head, anterior pronotal lobe and scutellum black with apex of tylus, scutellar carina and posterior pronotal lobe bright red-brown to castaneous; clavus and corium testaceous, suffused with dusky coloration on apical ⅓ of corium, membrane broadly sordid white-margined with brown veins and a large elongate brown central macula covering greater portion of membrane disc, but not extending to lateral or apical margins; abdomen uniformly red-brown; all femora bright reddish brown with tibiae and tarsi flavescent, antennal segments 1 and 2 red brown (3 and 4 missing); central area of head, large triangular and mesally contiguous patches on calli, posterior ⅓ of pronotum, and scutellar carina shining, remainder of dorsal surface and entire thoracic venter a strongly contrasting pruinose gray; pronotum punctate, posterior pronotal band smooth and glabrous; otherwise sparsely clothed with short, decumbent somewhat scale-like sericeous hairs.

Head slightly convex across vertex, non-declivent, tylus prominent, considerably exceeding juga but short, extending half way to distal end of 1st antennal segment, eyes flattened against head surface to form nearly evenly curving lateral

margins, set well away from antero-lateral pronotal angles, antenniferous tubercles strongly hooked, length head .61 mm, width head .80 mm, interocular space .53 mm; pronotum moderately convex, area across humeri slightly more swollen than anterior lobe, lateral margins sinuately narrowing from humeral angles to anterior margin, transverse impression very shallow, broad, complete, posterior margin slightly and evenly concave, a weak, broad punctate median groove between calli on anterior lobe, length pronotum 1.06 mm, width pronotum 1.25 mm; scutellum with a prominent shining median carina, length scutellum .53 mm, width scutellum .58 mm; hemelytra with lateral corial margins nearly parallel, evenly narrowing to expose connexiva, membrane reaching anterior margin of 7th abdominal tergum, distance apex clavus—apex corium 1.14 mm, distance apex corium—abdomen 2.85 mm; labium obscured, apparently extending to fore coxae; fore femora strongly incrassate, ventral surface narrowing to a subacute expanded ridge, armed below on distal ⅓ with a single large prominent acute spine; antennae stout, 2nd segment terete, length antennal segments I .19 mm, II .49 mm; total length 7.08 mm.

Holotype: Female. BRAZIL: Esp. Santo, 98 (Staud). In Hungarian National Museum.

This species is very closely related to *R. orbiculatus* Slater and Wilcox, the two species being unique within the genus in possessing similar "flattened" eyes and an ovoid head shape. However, the head and eyes of *orbiculoides* are significantly broader than are those of *orbiculatus,* and this gives a less "hemispherical" bulbous appearance to the head and can be expressed as a ratio of head width to interocular width (1.51 *orbiculoides,* 1.44 *orbiculatus*). The two species have pronota almost identical in shape, color and texture. *R. orbiculoides* has the most minute and obscure wing reticulation of any species in this genus. There are tiny roundish cells visible on the membrane, and only vestiges of the anastomosing lines usually present on the clavus and corium. *R. orbiculoides* also lacks the black points that are present at the caudo-lateral angles of abdominal connexiva 4 through 7 in *orbiculatus,* and has the entire 2nd antennal segment dark red-brown rather than strongly darkened on the distal half as in *orbiculatus.*

We have recently examined an additional female of *orbiculatus* in the Leningrad Museum from Rio Caqueta, Colombia VII-1926 (Woronov).

Patritiodemus delicatus, n. sp.

Body moderately elongate, robust, sub-linear; dorsal surface uniformly pruinose, including entire humeral area of pronotum, an irregular "comma-shaped" transverse shining band on calli and another anterior to ocelli; head and anterior pronotal lobe dark gray, pronotal collar, posterior pronotal lobe, tylus and scutellum bright reddish tan, abdomen red brown with connexiva a strongly contrasting yellow, hemelytra pale testaceous, veins and apical ⅓ of corium suffused with darker tan, legs and antennae uniformly very light yellow, 3rd and 4th antennal segments very lightly suffused with light brown, head and pronotum

finely and evenly punctate; scutellum with irregular relatively coarse punctures laterad of median elevation, scattered punctures present on clavus and corium; sparsely clothed, particularly laterad, with long semi-erect yellowish hairs.

Head broad, declivent, moderately convex across vertex, eyes protrudent, set well away from antero-lateral pronotal angles on shelf-like head extensions, juga short, blunt, tylus extending ⅓ distance to distal end of 1st antennal segment, length head .60 mm, width head .91 mm, interocular space .52 mm; pronotum with lateral margins slightly sinuate, narrowing strongly and evenly from humeral angles to anterior margin, posterior margin moderately concave with shallow caudo-lateral lobes produced laterad of scutellum, transverse impression broad, shallow, nearly obsolete, length pronotum .99 mm, width pronotum 1.30 mm; scutellum with a low median elevation on distal ⅔, length scutellum .51 mm, width scutellum .61 mm; hemelytra with lateral corial margins slightly sinuate, narrowing opposite claval commissure then abruptly widened posteriorly, membrane bluntly and evenly rounded at apex, covering anterior ⅓ of 7th abdominal tergum, distance apex clavus—apex corium 1.25 mm, distance apex corium—apex abdomen 2.04 mm; fore femora very slender, scarcely incrassate, armed below on distal ⅓ with a single short sharp spine; metathoracic scent gland orifice short, rounded, auricular, tilted slightly cephalad; labium reaching posterior margin of prosternum, 2nd segment surpassing base of head by ½ its length, length labial segments I .34 mm, II .30 mm, III .23 mm, IV .27 mm; antennae moderately elongate, slender, segments 2 and 3 terete, 4 narrowly fusiform, length antennal segments I .23 mm, II .69 mm, III .68 mm, IV .87 mm; total length 6.12 mm.

Holotype: Female. BRAZIL: Chapada "Acc. No. 2966," Oct. In Carnegie Museum.

Paratypes: 1 female, same data as holotype; 1 female, same except "Nov." In Carnegie Museum and J. A. Slater collections.

In the key to species of *Patritiodemus*, *P. delicatus* runs to *P. albomaculatus*, but is readily distinguishable from the latter by virtue of the much longer labium which reaches the base of the prosternum in *delicatus*, whereas it does not even attain the fore coxae in *albomaculatus*. *P. delicatus* is, in fact, unique within the genus *Patritiodemus* on this character, as all of the other species have the labium very short and at most attaining the fore coxae. The very delicate non-incrassate fore femora, lack of a diffuse central dark area on the hemelytra and generally pale coloration are all distinctive features.

Nevertheless, the protrudent nearly "stalked" eyes, presence of a fore femoral spine, and completely pruinose pronotum seem to us to warrant its inclusion in the genus *Patritiodemus*.

ACKNOWLEDGMENTS

We wish to extend our sincere appreciation to the following individuals for their kindness in allowing us to study material in their various institutions: Dr. P. Wygodzinsky (American Museum of Natural History), Dr. G. Wallace (Carnegie Museum), Dr. A. Soos (Hungarian National Museum), Dr. B. Torres (La Plata

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A REDESCRIPTION OF CULEX (ACALLEOMYIA) OBSCURUS (LEICESTER) (DIPTERA: CULICIDAE)[1]

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Culex (*Acalleomyia*) *obscurus* (Leicester) has been poorly characterized since its original description. Although Leicester (1908) recognized the highly modified male terminalia as being one of the outstanding distinguishing features of this species, his description was rather vague and was not accompanied by an illustration. Edwards (1922) illustrated the male terminalia, but the specimen which he used was apparently mounted in a somewhat twisted position. As a result, the representation of most of the structures is either misleading, incomplete, or erroneous. No subsequent author has attempted to rectify these descriptions, nor have the immature stages been described.

The following redescription is based on the type series in the British Museum (Natural History); on specimens received from Dr. S. Ramalingam, University of Kuala Lumpur, accessioned to the U. S. National Museum; on material collected by Dr. D. H. Colless on loan from the British Museum; and on specimens from the Institute for Medical Research, Kuala Lumpur, deposited in the U. S. National

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Museum. Format and terminology conforms to that followed by Bram (1967).

Culex (Acalleomyia) Obscurus (Leicester), 1908
(Fig. 1)

Acalleomyia obscurus Leicester, 1908, Cul. Malaya: 194 (♂, ♀).

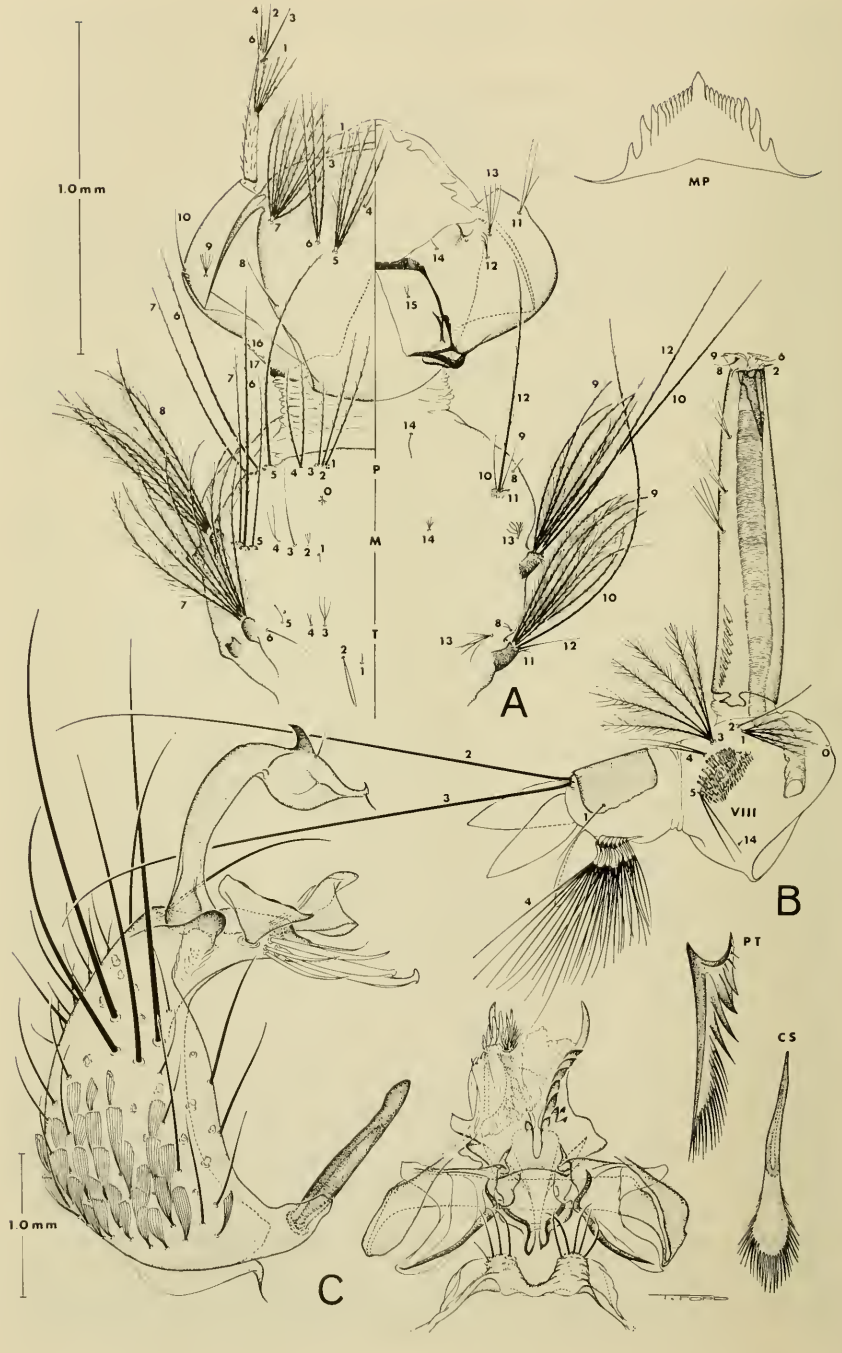
Micraedes obscurus (Leicester): Edwards, 1913, Bull. Ent. Res. 4:237 (taxonomy).

Culex (Acalleomyia) obscurus (Leicester): Edwards, 1922, Indian J. Med. Res. 10:285 (♂*); Macdonald and Traub, 1960, Stud. Inst. Med. Res. Fed. Malaya 29:105 (biology); Macdonald, Smith, and Webb, 1965, J. Med. Ent. 1:338 (distribution); Bram, 1967, Proc. Ent. Soc. Wash. 69:328 (lectotype designation).

The adult female is most difficult to recognize, but in well preserved specimens the rather broad, flat scales on the midlobe of the scutellum are diagnostic. The adult male is easily distinguished from other species of the genus by the short palpus and the unique terminalia. The fourth stage larva exhibits an incomplete saddle on abdominal segment X and characteristic comb scales.

FEMALE. A rather small species without distinctive ornamentation. *Head.* Proboscis uniformly dark brown; palpus very short, similar in color to the proboscis; length of antenna slightly less than that of the proboscis; vertex with narrow, dark decumbent scales at the occiput, becoming somewhat broader and pale at the orbital line; erect scales of the vertex forked, uniformly brown. *Thorax.* Integument of the scutum dark brown, clothed with rather dense, bronze-brown scales; acrostichal bristles developed only at the extreme anterior margin; anterior and posterior dorsocentral bristles well developed, as are the other bristle patterns normally found in the genus; midlobe of the scutellum clothed with a rather dense patch of broad, flat scales; integument of the pleuron pale brown (or with a greenish tint in some specimens), without noticeable scale patches; 1 prominent posterior sternopleural and 1 lower mesepimeral bristle present, in addition to the prominent bristles on the prealar area. *Wing.* Normal for the genus, with the dorsal scales uniformly bronze-brown. *Legs.* Anterior surface of the hind femur predominantly pale, with a rather broad apical dark band which extends proximally along the dorsal margin; hind tibia and tarsus dark; fore and mid legs dark, without indications of pale patterns. *Abdomen.* Terga totally dark brown; sterna somewhat lighter, but not pale.

MALE. Habitus similar to that of the female. *Head.* Palpus short, its length approximately 1/7 that of the proboscis; antenna sparsely plumose. *Terminalia.* (fig. 1C). Basimere well developed, clothed with both setae and scales (particularly on the proximal half); a prominent basal tubercle present on the mesal margin upon which is inserted a strong, broad, long, and heavily sclerotized, blunt rod and a shorter, slenderer, pointed rod; subapical lobe developed as a strong, conicle tubercle at the extreme apex of the basimere; a strong, long, hooked rod, a shorter, slenderer hooked rod, and a similar but pointed rod inserted at the crown of the tubercle in addition to several accessory setae; a prominent, strongly sclerotized, Y-shaped structure basad of the rods, followed by a broad, truncate leaf and with a prominent, straight seta inserted at the extreme base of the tubercle; distimere expanded subterminally, then narrowing at the apex; with a small recurved spine opposite the distimere claw, and a larger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recurved spine on the margin of the expanded area; phallosome similar to species of the subgenus *Culiciomyia*; lateral plate of the phallosome with a basal tooth and with from 7 to 10 lateral denticles of similar size; proctiger with a tuft of fine, dorsomesal spines and prominent, spatulate, lateroventral spines; from 2 to 4 short, cercal setae present; basal sternal process short and truncate; tergum IX deeply indented, with from 3 to 5 strong setae on each of the 2 lobes.

PUPA. Without outstandingly distinctive characteristics; similar to the pupae of species in the subgenus *Culiciomyia*.

LARVA (figs. 1A, B). *Head.* Antenna normal for the genus, with a narrow, dark basal ring; head hair 1-C filamentous, its length considerably less than half the distance between the bases of the pair; 4-C single, simple; 5-C with from 4 to 6 pectinate branches; 6-C with 3 or 4 pectinate branches; 16, 17-C represented by minute spicules. *Thorax.* Integument glabrous; hairs 1, 2, 3-P single, pectinate, 3-P fine, considerably shorter than 1, 2-P; 4-P bifid or trifid, pectinate; 5, 6-P single, pectinate; 7-P single or bifid, pectinate; 8-P very short and fine, single or bifid, simple; 14-P single, simple. *Abdomen.* Integument glabrous; comb consisting of a broad, somewhat triangular patch of 70 or more fan-shaped scales; siphon index variable, ranging from 3.8:1 to 5.5:1 (average of 6 specimens, 4.4:1); 3 pairs of subventral tufts inserted on the siphon; individual tuft with from 2 to 5 simple branches, its length approximately equal to the width of the siphon at the point of insertion; pecten consisting of from 7 to 10 teeth restricted to the basal third or less of the siphon; individual pecten tooth rather short, with from 3 to 5 distinct basal barbs and a series of fine spicules at the truncate apex; saddle of segment X darkly pigmented, incomplete; ventral brush consisting of 8 hair tufts inserted on the grid; anal gills longer than the saddle, gradually tapering to a rounded apex.

TYPE DATA. Lectotype female of *obscurus* from Kuala Lumpur is in the British Museum. Three lectoparatype females and 1 lectoparatype male (which is badly damaged and with terminalia missing) are also on deposit in the British Museum.

Six individual rearings with associated larval and pupal skins have been examined from Malaysia as well as 14 additional males and nine females.

DISTRIBUTION. This species was originally described from Kuala Lumpur, *Selangor*, MALAYSIA. Subsequently, Macdonald and Traub (1960) also collected specimens from the state of *Selangor*. Macdonald, Smith, and Webb (1965) reported material from Kampong China, Kuching, *Sarawak*. Specimens have been examined in the British Museum collection from Tawau, *Sabah*.

TAXONOMIC DISCUSSION. The monotypic subgenus *Acalleomyia* demonstrates closest affinity to the subgenus *Culiciomyia*. The

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Fig. 1, *Culex* (*Acalleomyia*) *obscurus* (Leicester). A, dorsoventral aspect of the head and thorax of the fourth stage larva; B, lateral aspect of the terminal abdominal segments of the fourth stage larva; C, tergal aspect of the male terminalia.

phallosome of the male terminalia of *obscurus* is consistent with species of *Culiciomyia* in Southeast Asia and the fourth stage larva exhibits a number of points in chaetotaxy, particularly the ventral brush of abdominal segment X consisting of only eight hair tufts, which are suggestive of the subgenus *Culiciomyia*. However, the short male palpus is certainly not consistent with *Culiciomyia*, nor is the basimere of the male terminalia, which is clothed with scales as well as setae and which demonstrates a unique basomesal tubercle possessing two strong rods. In the fourth stage larva, head hair 1-C is exceptionally short and fine and the saddle of abdominal segment X is incomplete; otherwise, chaetotaxy and structure are quite similar to *Culiciomyia*. In the adult female of *obscurus*, the most noteworthy variation from *Culiciomyia* is the presence of a rather dense patch of broad, flat scales on the midlobe of the scutellum.

As has been suggested for the subgenus *Acallyntrum* by Belkin (1962), it is quite possible that *Acalleomyia* represents an off-shoot of the *Culiciomyia* stem with specialized requirements for leaf axil or stump hole habitats.

BIOLOGY. Macdonald and Traub (1960) collected larvae from coastal areas of Selangor in the axils and stumps of *Nipa*-palms. Specimens have been examined from Sabah which were collected from the saline habitat of a hole in a fallen mangrove tree. Ramalingam and associates (pers. comm. 1967) have collected larvae on eight occasions from the brackish water in *Nipa*-palm leaf axils in a secondary mangrove area and also collected a single female of this species biting man in the vicinity of the larval collections. Adults and larvae of *obscurus* have been collected during the months of July, October, December, and February.

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GRYLLOPROCIPHILUS FROSTI, NEW GENUS, NEW SPECIES, FROM THE EASTERN UNITED STATES

(HOMOPTERA: APHIDIDAE)[1]

CLYDE F. SMITH *and* JOHN O. PEPPER[2]

Grylloprociphilus frosti probably lives on the subterranean parts of its unknown host for the major portion of its life cycle as is customary with most species in related genera. It is named in honor of Dr. S. W. Frost who collected the majority of the known specimens. It is described in the hope that other entomologists might help unravel the life history of this interesting species which apparently produces sexuparae only during the shortest days of the year.

Grylloprociphilus, n. gen.

Antennae 6-segmented, secondary sensoria oval, ciliated. Fore wings with media simple. Hind wings with media and cubitus originating near the same point. Metafemora on sexuparae distinctly larger than pro- or mesofemora. Cauda rounded, indistinct.

Grylloprociphilus differs from *Pemphigus* Hartig, 1839, *Prociphilus* Koch, 1857, and *Stagona* Koch, 1857, in having the metafemora enlarged. From *Pemphigus* it differs in having more setae on R IV + V and the secondary sensoria with long cilia. From *Prociphilus* and *Stagona* it differs in having spine-like setae at the apex of the tibiae.

Type-species: *Grylloprociphilus frosti,* n. sp.

Grylloprociphilus frosti, n. sp.
(Figs. 1, 2)

Characteristics: Head without wax plates. Secondary sensoria distinctly ciliated, sensoria on a.s. III on distal half, a.s. VI with numerous, conspicuous setae. R IV + V bearing 4 to 8 accessory setae.

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[2] Professor, North Carolina State University at Raleigh, and Professor Emeritus, Pennsylvania State University, University Park, Pa., respectively. The authors express their appreciation to Louise M. Russell, U. S. Department of Agriculture, Washington, D. C.; D. Hille Ris Lambers, Bennekom, Netherlands, and H. L. G. Stroyan, Harpenden, Herts, England for their opinions and to the U. S. National Museum for loan of specimens.

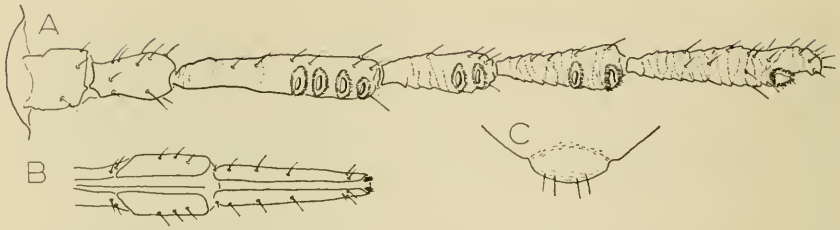


Fig. 1, *Grylloprociphilus frosti*, n. sp.: (A) antenna; (B) R IV + V; (C) cauda. (Drawings by John Graham)

Wax plates on dorsum of thorax distinct, distance between wax plates being approximately equal to longest diameter of plates. Protarsomere I with one seta distinctly shorter and more peg-like than the other setae. A slide in the U. S. National Museum bears the following data, "Flying, Nov. 19. 15. Abd. yellowish green slightly covered with cottony excretion."

Sexupara: Head dark, without wax plates. Antennae dark; setae on a.s. III approximately equal to ½ diameter of segment, setae conspicuous, especially on a.s. VI; secondary sensoria on distal half of segments, distinctly ciliated, outer rim approximately ⅔ to ¾ diameter of segment. R IV + V attaining second coxae and bearing 4 to 8 accessory setae.

Pro-, meso-, and metathorax with distinct oval wax plates. Distance between plates approximately equal to greatest diameter of plate. Metafemora distinctly larger (wider) than pro- or mesofemora. All femora rugose dorsally, denticulate ventrally. Distal end of each tibia with 4 spine-like setae. Other setae on tibiae long, many of them being equal to or longer than diameter of tibia. Tibiae without denticulations. Chaetotaxy of tarsomeres I–III, 3 to 7, variable, usually 6-5-4. Protarsomere I bearing one seta distinctly shorter and more spine-like than the other setae. Plantar setae approximately ⅓ length of claw, pointed. Tarsomeres with faint denticulations.

Abdomen with marginal wax plates which are nearly circular and increasing slightly in diameter toward the caudal end. Marginal wax plates bearing 1 to 6 setae, those nearest the caudal end having the greater number. Two round medial wax plates on dorsum of abdominal segment I and one elongated plate on segment VIII which bears 4 to 9 setae. Genital plate with approximately 12 setae on the caudal margin and 12 more scattered over the rest of the plate. Gonapophyses variable, but usually bearing 4-3-4 setae. Anal plate with 5 to 9 setae, about the same shape and length as the setae on the cauda. Cauda bearing 3 to 5 setae.

Measurements:[3] Body length 2.43 (1.73–2.94). R IV + V, 0.15 (0.11–0.19); a.s. III, 0.24 (0.18–0.29); IV, 0.14 (0.09–0.15); V, 0.15 (0.11–0.19); VI, 0.16 (0.14–0.19) + 0.04 (0.03–0.04). Hind tibiae 0.88 (0.65–0.89); hind tarsi, 0.22 (0.16–0.25).

Secondary sensoria. A.s. III 3–4 (3–5), IV, 2–3 (2–3), V, 2–3 (1–3).

Embryos of the sexupara with vestigial mouth parts. Plantar setae longer than the claws and expanded at the tip.

[3] All measurements are in millimeters. The first number refers to holotype, the numbers in parentheses show the range of 11 specimens measured.

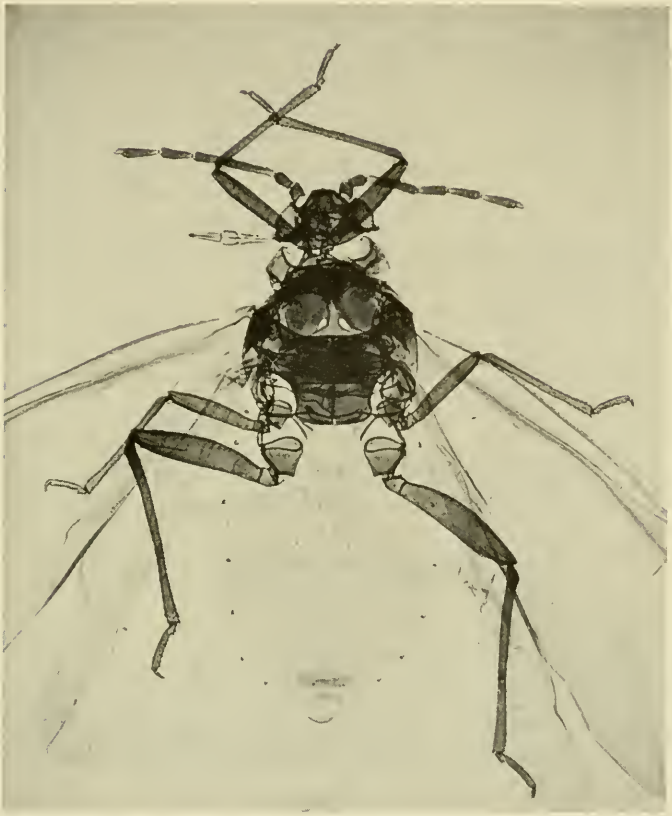


Fig. 2, *Grylloprociphilus frosti,* n. sp. (Photograph by A. T. Olive)

Type locality: Lake Placid (Archbold Biological Station), Florida.

Types: Holotype and some paratypes in the United States National Museum. Other paratypes in the collections of H. L. G. Stroyan, Harpenden, Herts, England; D. Hille Ris Lambers, Bennekom, Netherlands; the British Museum of Natural History, London, England; the Canadian Museum of Natural History, Ottawa, Canada; A. N. Tissot, Gainesville, Florida; the North Carolina State University at Raleigh; and the authors.

Collections: Data on 3 slides in the United States National Museum indicate this species was first collected "flying" November 18, '95 (probably 1895) (one specimen). No locality or collector recorded. In 1941 W. F. Turner collected a single specimen on January 29 in Peach County, Georgia. On February 3, 1932, P. W. Mason collected 3 specimens (one slide) "swarming" in Washington, D. C. Numerous specimens have been collected by S. W. Frost in a black light trap

at Lake Placid (Archbold Biological Station), Florida, 1958–1964 (Holotype and Paratypes), during the months of November through January. In a note Dr. Frost wrote "104 specimens taken night of Jan. 4, 1964, very few taken before or afterwards." John Graham collected one specimen in a "Sticky band trap" in a "Beech woods" at Raleigh (Umstead Park), North Carolina, February 24, 1962, one specimen in a "cob web, Nov. 28, 1963" and one "in flight, Raleigh, N. C., Jan. 5, 1962." J. O. Pepper and B. F. Coon collected one specimen in a black light trap at Center Hall, Pa., Oct. 19–26, 1958. We do not know the host of this aphid.

TEN NEW CHRYSOMELID BEETLES FROM DOMINICA AND JAMAICA

Doris H. Blake, *Department of Entomology, Smithsonian Institution, Washington, D. C. 20560*

The following new species of Chrysomelidae, with one exception, were collected during the Bredin-Archbold Smithsonian Biological Survey in Dominica. A. B. Gurney on his way back from Dominica collected a new species of *Oedionychus* in Jamaica.

Habrophora thelmae, n. sp.
(Fig. 1)

Elongate oblong oval, clothed with short, fine, appressed, yellow pubescence; head, prothorax and breast dull brown, elytra, abdomen and legs paler yellow brown, elytra with dark spot on basal umbone and a dark lateral stripe from humerus along side to middle, an irregular fascia across elytra at middle, also 3 inconspicuous costae on each elytron with dense striate punctures on each side of them, the intervals between confusedly punctate; antennae pale yellow brown with joints 7, 8, 10 and 11 dark.

Head with interocular space half width of head, eyes emarginate, occiput and front with fine yellow pubescence, an inconspicuous dark median line, clypeus with finely punctate surface not completely hidden by pubescence, labrum pale, jaws piceous. Antennae extending to middle of elytra, long and slender, pale yellow brown with distal joints dark. Prothorax densely covered with pale pubescence that hides the dense punctation; a transverse depression in basal half, convex with rounded sides and very thin line marking lateral margin, prosternum taken up with coxal cavities, between these a moderately wide median area. Scutellum densely pubescent. Elytra elongate, thinly covered with appressed yellow pubescence and with 3 somewhat inconspicuous costae edged on either side with a dense row of striate punctures, intervals with confused punctures;

a prominent basal umbone on each elytron and small prominent humeri with intrahumeral sulci; basal umbones deep brown, humeri and sides to middle also brown, at middle an irregular brown fascia across. Femora slightly enlarged, tibiae long and slender, claws toothed. Length 5.5 mm, width 2.2 mm.

Type, female, USNM 69718.

Type locality.—Pont Lolo, 1800 ft. alt., Dominica, Feb. 19, 1965, collected by J. F. G. and T. M. Clarke.

Remarks.—Although this species certainly belongs in an Eumolpid genus close to *Fidia, Xanthonia* and *Habrophora,* and especially the last, it differs from them by having the elytral punctation not definitely striate. As in *Habrophora* there are three elytral costae on each elytron, each having on each side a row of dense striate punctures. Because of these costae edged with striate punctures, I am putting it in the genus *Habrophora,* but it differs from the other species of the genus that I have examined in having distinctly confused punctation in the intervals and in having sparser elytral pubescence. I take pleasure in naming this after Mrs. J. F. G. Clarke, who did her share of the collecting on Dominica.

Alethaxius dominicae, n. sp.
(Fig. 7)

Oblong oval, yellow brown with deeply and densely punctate head, prothorax and elytra, elytra with punctures somewhat confused in basal half, on sides and at apex striate punctures with costate intervals, much more pronounced in female.

Head with interocular space approximately half width of head, a median line down front, surface densely and deeply punctate, clypeus dull and alutaceous and separated from front by somewhat indistinct sulcus. Antennae extending below humeri, joints 7–11 darker and wider. Prothorax moderately convex with 2 angularities on each side, dull yellow brown, deeply and moderately densely punctate. Scutellum dark. Elytra with confused punctures in basal half from about scutellum to middle, on sides and below the middle in apical half striate rows of punctures with costate intervals, much more developed in female. Body beneath reddish brown, legs yellowish brown, not toothed. Length 2.3–2.7 mm; width 1–1.5 mm.

Type, male, USNM 69719.

Type locality.—Clarke Hall, Dominica, Feb. 4–7, 1965, H. E. Evans.

Other locality.—½ mile west of Pont Lolo, 1800 ft. alt., Dominica, Feb. 19, 1965, J. F. G. and T. M. Clarke.

Remarks.—In size and coloration this is very much like *A. puertoricensis* Blake, but lacks the knobby projections on the elytra, especially noticeable in the female of that species, although even the male has a few knobs about the humeri. In this species the female has very strongly developed costae that in the male are noticeable on the sides and apex. The single female was collected farther up the mountain but in the same general area, and there is no question it is the same species.

Metachroma gagnei, n. sp.
(Fig. 6)

Oblong oval, shining, yellow brown with reddish brown basal and 2 lateral spots on each elytron; striate punctures on elytra feeble over basal callosities, fading away on sides and at apex; pronotum impunctate; antennae with apical joints darker.

Head with interocular space less than half width of head, occiput and front nearly impunctate, a transverse sulcus between antennal sockets, clypeus nearly impunctate. Antennae long and slender with apical joints thicker and darker. Prothorax evenly rounded but not very convex with rounded lateral sides and depression over head; mirror smooth, yellow brown. Scutellum reddish brown. Elytra with striate punctures nearly obsolete over basal callosities and indistinct on sides and at apex; a median long reddish brown basal spot on each elytron and 2 others along the side, one below humerus, the other, larger, at about the middle. Body beneath yellow brown, shining, legs pale, femora not toothed. Length 2.5 mm; width 1.3 mm.

Type, female, USNM 69720.

Type locality.—Path to Cabrits, Dominica, 2 April 1966, R. J. Gagne.

Remarks.—There is only one specimen of this small species which is about the size of *M. testaceum* Blatchley from the tip of Florida and Cuba. It is the smallest species of *Metachroma* from Dominica yet collected and rather distinctively marked with the reddish brown elytral spotting.

Galerucella brevivittata, n. sp.
(Fig. 2)

Elongate with short prothorax and long, parallel-sided elytra, dull yellowish brown with dark head, prothorax with a diagonal dark mark on either side, elytra with 6 deeper brown vittae and brown sutural edges, the median vittae not reaching base or apex, all covered with very short fine pubescence.

Head with wide set eyes and a median line down occiput to interantennal area, little evidence of tubercles or frontal carina, lower front short and somewhat depressed, occiput and mouthparts dark. Antennae extending below humeri, 2 basal joints rather inflated, 3rd joint longest of all, remainder diminishing and somewhat wider, with base pale, apex dark, apical 3 joints entirely dark. Prothorax transverse with sides and median anterior area depressed, at each angle a small tooth, dull yellow brown with piceous diagonal plaga on each side, surface finely and densely punctate with a few short hairs. Scutellum dark. Elytra elongate, parallel-sided with prominent humeri and short intrahumeral sulcus, depressed below scutellum, surface finely punctate and covered with short fine yellowish pubescence, closely appressed; yellow brown with darker sutural edges, and on each elytron 2 median dark brown vittae, 1 from the scutellum, the other from end of intrahumeral sulcus, not reaching base or apex, a 3rd from the humerus. Body beneath dark except for pale yellow brown prosternum, and somewhat darker legs. Length 5.2 mm; width 2.5 mm.

Type, male, USNM 69721 and four paratypes.

Type locality.—Clarke Hall Estate, Dominica, May 31, 1966, G. Steyskal. Feb. 4–7, 1965, H. E. Evans.

Other localities.—3 m. w. Pont Lolo, 1800 ft. alt. Feb. 19, 1965, J. F. G. and T. M. Clarke.

Remarks.—This is another of the species of West Indian *Galerucella* with long, vittate elytra. In this one the median vittae do not reach entirely from base to apex. Other vittate species closely resembling it but differing in the vittae are *G. jamaicensis* Blake, *G. melanocephala* Blake, *G. maculipes* Blake, and *G. oteroi* Blake, the last three from Cuba.

Oedionychus gurneyi, n. sp.
(Fig. 3)

Elongate oblong oval, shining, nearly impunctate, rather flat with wide explanate margin, yellow brown, pronotum with wide piceous vitta curving on the inner side on each side near explanate margin, elytra with a piceous marking covering humerus and extending below middle, across apex an irregular piceous band.

Head with interocular space less than half width of head, yellowish brown with well developed frontal tubercles, a short carina and short lower front; fine punctures over upper face. Antennae yellow brown with apical joints deeper in coloring, slender, not reaching middle of elytra. Prothorax nearly flat with wide explanate margin, yellow brown with a wide curving piceous vitta on each side; surface shining with almost imperceptible fine punctures. Scutellum triangular, pale. Elytra long, wider than prothorax, with wide explanate margin and about 5 times as long as prothorax; shining pale yellow brown with irregular piceous marking from humerus to beyond middle, before apex a narrow irregular band nearly across elytra. Body beneath and legs pale yellow brown. Length 6.8 mm; width 3.3 mm.

Type, female, USNM 69722 and one paratype, female.

Type locality.—Green Hills, Portland Parish, ca. 3800 ft. alt., Nov. 13–20, 1966, A. B. Gurney.

Remarks.—The dark piceous markings on the pronotum and elytra are unlike those of any other species of *Oedionychus* found in the West Indies, and because of the high mountain region in which it was collected, I believe it is endemic in Jamaica. I take pleasure in naming it for its collector, Dr. Gurney.

Hadropoda xanthoura, n. sp.
(Fig. 9)

Elongate oblong oval, reddish or yellowish brown, densely covered with short fine golden and brown pubescence, prothorax only a little wider than long with nearly straight sides, elytra much wider than prothorax with striate punctation more or less covered by pubescence, an irregular brownish fascia below middle made by short brown pubescence, which is also present on basal callosities; apex densely clothed with yellow pubescence.

Head brownish with interocular space less than half width of head, eyes large, face long, a deep linear depression above carina between absent frontal tubercles, carina between closely set antennal sockets very narrow and short, lower front depressed, occiput covered with short pale pubescence. Antennae filiform, basal and 2nd joints swollen, 3rd joint long and slender, longer than 4th or 5th which

are subequal, 6th shorter, 7–10th shorter and wider and tending to be darker. Prothorax only slightly wider than long, convex with a hump in middle and depressed in basal part; pale yellowish brown covered with fine, appressed, short pubescence. Scutellum pale and with fine pubescence. Elytra much wider than prothorax, regularly striate punctate, with strong basal callosities, surface covered more or less by fine, short, appressed pubescence that over basal callosities tends to be deep brown and also an irregular brown fascia of brown pubescence across elytra in apical half, rest of elytra with short golden pubescence. Body beneath and legs pale yellowish or reddish brown, less densely pubescent. Length 3.9–4.2 mm; width 3.6–1.8 mm.

Type, male, USNM 69723.

Type locality.—2.5 m east of Pont Casse, Dominica, Jan. 16, 1965, W. W. Wirth.

Other localities.—Freshwater Lake, 21 Jan. 1965, W. W. Wirth; Springfield Estate, 20 July 1963, O. S. Flint, Jr.; S. Chiltern Estate, 20 Feb. 1965, W. W. Wirth.

Remarks.—This is unlike any other species of *Hadropoda* in the markings. It resembles somewhat *H. calva* Blake from the Dominican Republic, but that species has the occiput devoid of pubescence.

Lactica flinti, n. sp.

(Fig. 4)

Elongate oblong oval, shining, nearly impunctate, pale reddish brown with antennae except 2 basal joints and tarsi except 1st joint of hind one dark, a dark reddish brown spot on either side of pronotum.

Head with interocular space more than half width of head, a large puncture surrounded by several smaller ones on either side near eye, frontal tubercles rather indistinct and a very short carina, lower front depressed. Antennae long and except for 2 basal joints dark. Prothorax with slightly rounded sides and a feebly marked basal sulcus, on either side a deeper reddish brown spot; surface shining, minutely punctate. Scutellum pale. Elytra elongate, with small sharp humeri, a short intrahumeral sulcus and faint umbone at base; shining, reddish brown, not visibly punctate. Body beneath shining reddish brown with few punctures and nearly glabrous, legs reddish brown except for black tarsi, and the first joint of hind tarsi not dark. Length 3.5–3.7 mm; width 1.8 mm.

Type, male, and one paratype, female, USNM 69724.

Type locality.—.4 mile E. of Pont Casse, collected May 6 and June 23, 1964, O. S. Flint, Jr.

Remarks.—Dr. Flint tells me these beetles were taken at about 2000 ft. altitude, at the beginning of the rain forest. I have already described one other pale species of *Lactica* from Dominica, collected at 800 ft. altitude by R. G. Fennah. *L. flinti* differs from this one in coloration having only the tarsal joints dark, and also in having two spots on the pronotum. This pronotal spotting is unlike any up to now found in these pale species from the West Indies. The basal sulcus on the pronotum is also feebler in comparison with the rest.

Heikertingerella wirthi, n. sp.
(Fig. 10)

Ovate, shining yellow brown, finely punctate, last 5 joints of antennae deeper brown.

Head with interocular space less than half width of head, eyes very large, interantennal area narrow and produced in a long carina extending down front, deep brown. Antennae with 2 basal joints swollen, 3rd short, remainder long, subequal and filiform, last 5 or 6 joints deeper brown. Prothorax yellowish or even reddish brown, minutely punctate, sides contracting in a straight line towards eye, basal margin sinuate over scutellum. Scutellum yellowish or reddish brown. Elytra convex, widest at middle, with small humeri, surface moderately shiny, finely punctate, yellowish brown. Body beneath and legs yellowish or reddish brown. Length 2.2–2.9 mm; width 1.5–1.8 mm.

Type, male, USNM 69725 and four paratypes.

Type locality.—Freshwater Lake, Dominica, April 14, 1964, O. S. Flint, Jr.

Other localities.—Clarke Hall, 11–20 March 1965, W. W. Wirth; Tareau Cliffs, La Franchetti, April 13, 1966, R. J. Gagne.

Remarks.—It is difficult to distinguish this species from *H. dominicae* Blake except by comparison of the aedeagi. In general *H. dominicae* is larger and wider and more rounded, and not so distinctly punctate. In my description of *H. dominicae* I wrote that two specimens collected by R. H. Foote on Dominica, both females, were more distinctly punctate than the type specimen. I believe now that these may be *H. wirthi* although there is no certainty because they are both females.

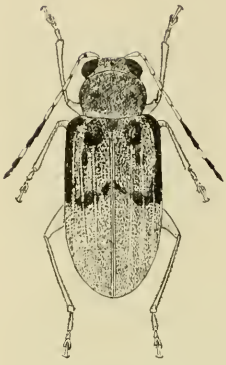
Sidfaya philtata, n. sp.
(Fig. 5)

Ovate, moderately convex, shining black with yellowish brown mouthparts, antennae and legs, hind femora dark; densely and coarsely punctate; prothorax without depressions and with oblique anterior angles and an angularity at middle of sides.

Head with smooth polished occiput and a deep line on either side from above eyes to well marked frontal tubercles; interantennal area broad and extending a short way down front, lower front short and mouthparts somewhat declivous and pale. Antennae extending below humeri, 2 basal joints somewhat swollen, joints 3–7 pale and slender, apical joints thicker and darker. Prothorax moderately convex, anterior angles widely oblique, an angle at middle of side, and a small basal tooth; surface shining, black with coarse but not dense punctation. Scutellum dark. Elytra with sharp prominent humeri and slight basal umbone having a faint transverse depression below; surface shining black with coarser and denser punctation than on pronotum. Body beneath and hind femora shining black, nearly impunctate and glabrous. Length 2.4 mm; width 1.4 mm.

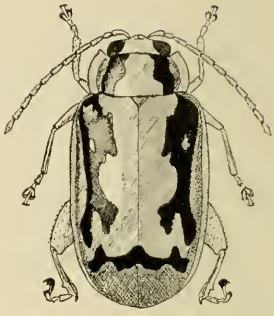
Type, female, USNM 69726 and two paratypes, both female.

Type locality.—1.6 miles west of Pont Casse, Dominica, April 24, 1964, O. S. Flint, Jr.; April 10, 1966, R. J. Gagne.

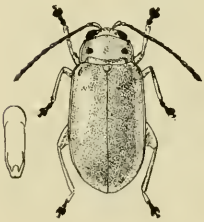


1. Habrophora thelmae

2. Galerucella brevitfata



3. Oedionychus gurneyi

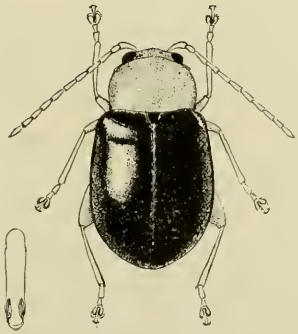


4. Lactica flinti

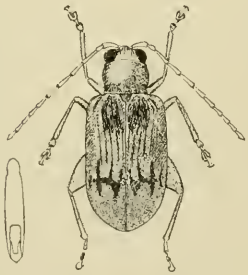
5. Sidfaya philtata

6. Meiachroma gagnei

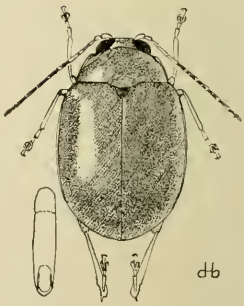
7. Alethaxius dominicae



8. Homoschema dominicae



9. Hadropoda xanthoura



10. Heikertingerella wirthi

Remarks.—This is the third species of the genus to be described, the first being S. *polutima* Blake from Cuba, the second, S. *punctatissima* Blake from Jamaica. In its short broad prothorax and coarse elytral punctation this resembles the Jamaican species, but in its ovate shape it is more like the Cuban species. All three species are shining black with coarse, confused punctation, and the prothorax has broad oblique angles anteriorly and in the middle of the side a distinctive angularity.

Homoschema dominicae, n. sp.
(Fig. 8)

Lustrous, head, prothorax, legs and antennae orange yellow, elytra bluish or greenish, often purplish, very finely punctate.

Head with wide set eyes, rounded occiput, a line of punctures from eyes to well developed frontal tubercles, a very short carina and short lower front of face. Antennae extending below humeri, basal joints swollen. Prothorax moderately convex with well rounded sides and oblique anterior angles and small tooth at basal angles, basal margin nearly straight; disc nearly impunctate, lustrous orange yellow. Scutellum dark brown. Elytra lustrous greenish or purplish blue, moderately convex with transverse depression below basal callosities; very finely and inconspicuously punctate. Body beneath with abdomen and sometimes breast brown; hind legs with swollen femora. Length 2.3–2.6 mm; width 1.3–1.5 mm.

Type, male, and eight paratypes, USNM 69727.

Type locality.—Mero, Dominica, collected by O. S. Flint, Jr., 24 July 1963.

Remarks.—This is one of the smaller species of *Homoschema* and with its dark abdomen akin to *H. nigriventrum* Blake from Puerto Rico, although the aedeagus is more like that of *H. jamaicense* Blake.

NEW SPECIES OF NEOACARUS HALBERT AND VOLSELLACARUS COOK FROM NORTH AMERICA[1]

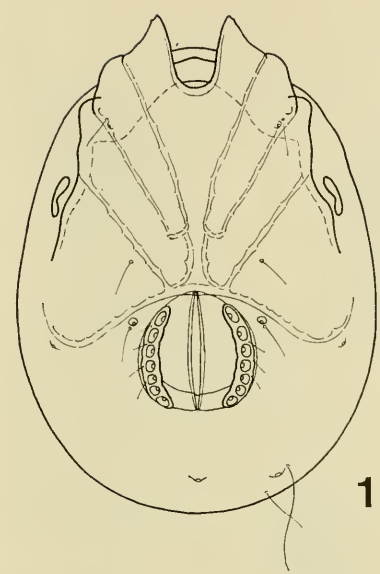
(ACARINA: NEOACARIDAE)

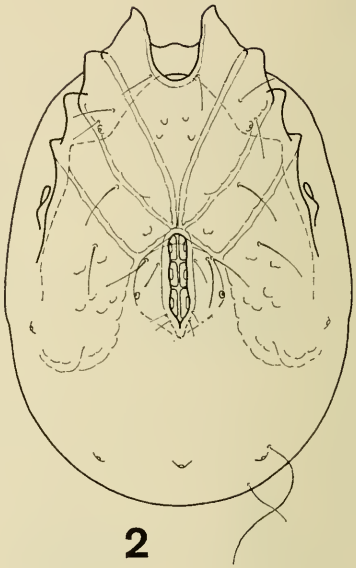
DAVID R. COOK, *Department of Biology, Wayne State University, Detroit, Michigan 48202*

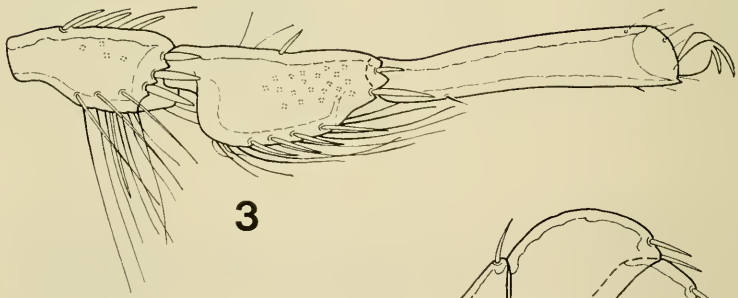
Cook (1963) described four species of *Neoacarus* and the new neoacarid genus *Volsellacarus* from the interstitial waters of North America. The present study[2] adds two new species of *Neoacarus* and one new species of *Volsellacarus*, all from the ground water habitat. In presenting measurements in this paper, those of the holotype and

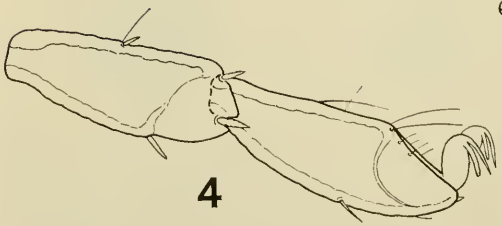
[1] Contribution No. 189 from the Department of Biology, Wayne State University.

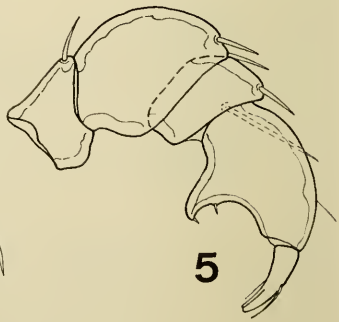
[2] Supported by a grant (GB-3717) from the National Science Foundation.











Figs. 1–5, *Neoacarus occidentalis,* n. sp.: 1, ventral shield, ♀; 2, ventral shield, ♂; 3, III-Leg-4, 5, 6, ♂; 4, I-Leg-5 and 6, ♀; 5, palp, ♂.

allotype are given first. If a series of specimens is available, the range of variation is given in parentheses following the measurements of the primary types. Holotypes and allotypes will be placed in the Field Museum of Natural History (= Chicago Natural History Museum).

Neoacarus occidentalis, n. sp.
(Figs. 1–5)

Male: Dorsal shield 502 μ in length, 349 μ in width; ventral shield, including first coxae, 562 μ in length, 410 μ in width; ventral shield oval; first coxae fused medially without any trace of a suture line between them; third and fourth coxae separated medially by the genital bay; fourth coxae extending well posterior to the genital field (fig. 2); genital field long and narrow, 107 μ in length; three pairs of elongated genital acetabula present, these occupying opening of gonopore; gonopore flanked by a pair of glandularia; eyes reduced, integumental pigment absent.

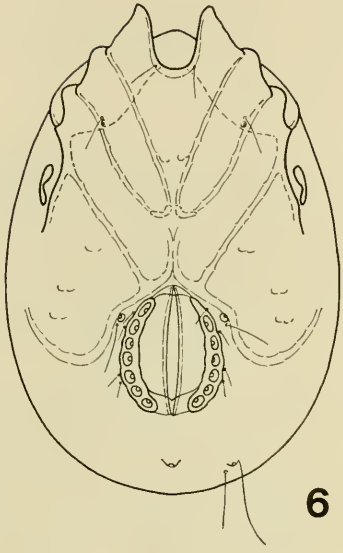
Dorsal lengths of the palpal segments: P-I, 24 μ; P-II, 38 μ; P-III, 19 μ; P-IV, 42 μ; P-V, 22 μ; ventral portion of P-IV expanded into a pointed projection, the distal margin of which bears 2 spine-like setae (fig. 5); dorsal lengths of the distal segments of the first leg: I-Leg-4, 80 μ; I-Leg-5, 97 μ; I-Leg-6, 110 μ; dorsal lengths of the distal segments of the third leg: III-Leg-4, 103 μ; III-Leg-5, 134 μ; III-Leg-6, 176 μ; III-Leg-5 expanded ventrally, gradually tapering towards distal end; fig. 3 illustrates the chaetotaxy of these segments; anterior surface of III-Leg-5 with a patch of swimming hairs (shown as stippled setal bases on fig. 3).

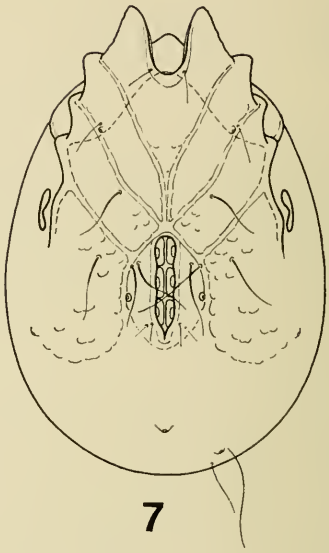
Female: Dorsal shield 509 μ in length, 364 μ in width; ventral shield, including projecting first coxae, 566 μ in length, 426 μ in width; ventral shield oval; first coxae fused medially without a trace of a suture line; second and third coxae slightly separated medially; fourth coxae forming a shallow genital bay; genital field 131 μ in length, 129 μ in width; gonopore relatively large; 7 genital acetabula present on each side, these lying on elongated sclerites on their respective sides; acetabular sclerites only lightly fused with the ventral shield (fig. 1); eyes reduced in size, integumental pigmentation absent.

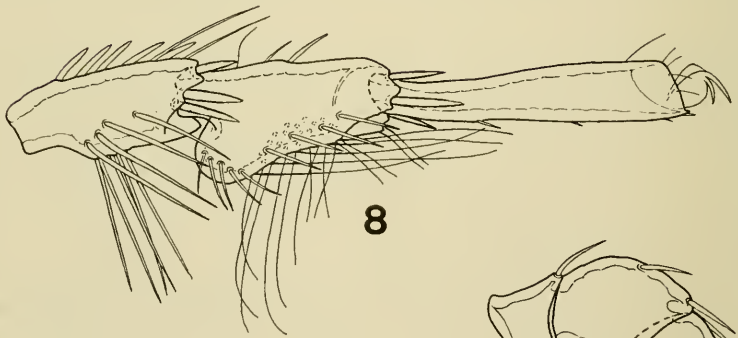
Dorsal lengths of the palpal segments: P-I, 19 μ; P-II, 40 μ; P-III, 17 μ; P-IV, 42 μ; P-V, 22 μ; structure and chaetotaxy of palp similar to that illustrated for the male; dorsal lengths of the distal segments of the first leg: I-Leg-4, 79 μ; I-Leg-5, 93 μ; I-Leg-6, 100 μ; Fig. 4 illustrates the proportions and chaetotaxy of I-Leg-5 and 6.

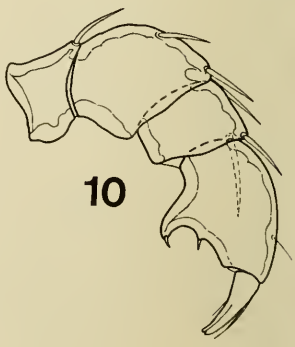
Types: Holotype, adult male, taken in a gravel bar in Battle Creek adult female, same data as holotype. A newly metamorphosed male four miles west of Viola, Shasta Co., California, July 30, 1966; allotype, which appears to belong to this species was collected in a gravel bar in Bingham Creek approximately eight miles northeast of Satsop, Mason Co., Washington, August 5, 1966. It is not assigned to the type series.

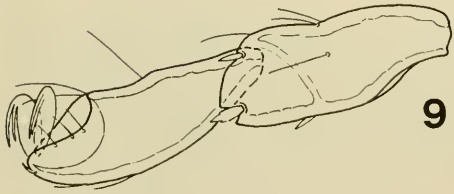
Discussion: This is the first species of *Neoacarus* known from the West Coast area of North America. The structure of the palp, with the projection on P-IV ventral rather than distoventral in position, will











Figs. 6–10, *Neoacarus minimus,* n. sp.: 6, ventral shield, ♀; 7, ventral shield, ♂; 8, III-Leg-4, 5, 6, ♂; 9, I-Leg-5 and 6, ♀; 10, palp, ♀.

separate *N. occidentalis* from any previously described species. However, the following species possesses a similar palp. See the discussion section under the latter.

Neoacarus minimus, n. sp.
(Figs. 6–10)

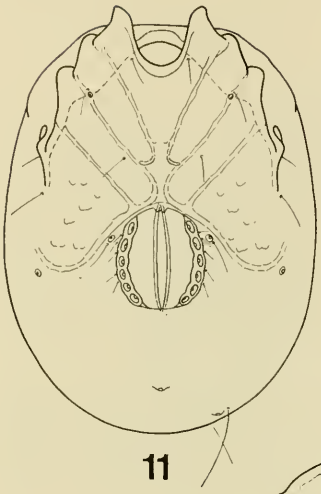
Male: Dorsal shield 380 μ (380–403 μ) in length, 273 μ (273–289 μ) in width; ventral shield, including first coxae, 456 μ (456–470 μ) in length, 304 μ (304–327 μ) in width; ventral shield oval; first coxae fused medially without any trace of a median suture line; third and fourth coxae separated medially by the genital field; fourth coxae extending only slightly posterior to the genital field; genital field long and narrow, 95 μ (95–97 μ) in length; 3 pairs of genital acetabula present, these occupying opening of gonopore; gonopore flanked by a pair of glandularia and 2 pairs of relatively long setae (fig. 7); eyes reduced, integumental pigment absent.

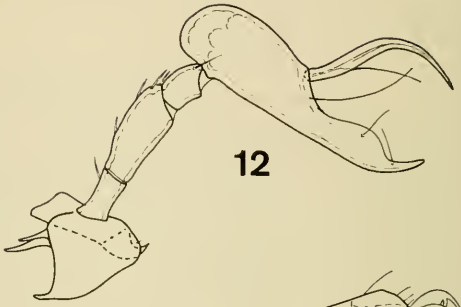
Dorsal lengths of the palpal segments: P-I, 20 μ (19–20 μ); P-II, 34 μ (32–35 μ); P-III, 18 μ (17–18 μ); P-IV, 35 μ (35–37 μ); P-V, 19 μ (18–21 μ); ventral portion of P-IV expanded into a pointed projection, the distal margin of which bears 2 small spine-like setae; dorsal lengths of the distal segments of the first leg: I-Leg-4, 69 μ (66–69 μ); I-Leg-5, 95 μ (90–95 μ); I-Leg-6, 107 μ (104–110 μ); dorsal lengths of the distal segments of the third leg: III-Leg-4, 93 μ (87–93 μ); III-Leg-5, 107 μ (104–107 μ); III-Leg-6, 135 μ (131–140 μ); III-Leg-5 expanded ventrally, gradually tapering towards distal end; ventral expansion of III-Leg-5 pointing somewhat proximally; fig. 8 illustrates the chaetotaxy of these segments; anterior surface of III-Leg-5 bearing a small patch of swimming hairs (shown as stippled setal bases in fig. 8).

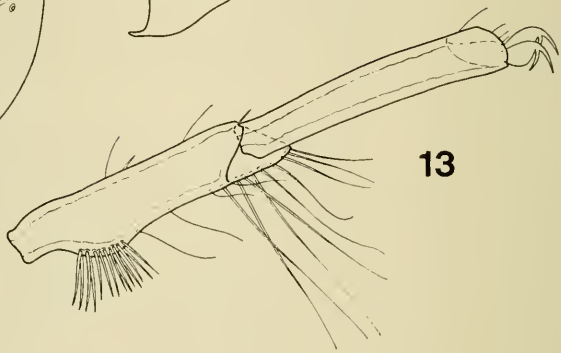
Female: Dorsal shield 414 μ (395–414 μ) in length, 304 μ (289–304 μ) in width; ventral shield, including first coxae, 486 μ (464–486 μ) in length, 334 μ (326–334 μ) in width; ventral shield oval; first coxae fused medially without a trace of a suture line; fourth coxae forming a relatively deep genital bay (fig. 6); genital field 121 μ (117–121 μ) in length, 103 μ (98–103 μ) in width; gonopore relatively large; 7–8 (6–8) genital acetabula present on each side, these lying on elongated sclerites on their respective sides; acetabular sclerites fused with the ventral shield; eyes reduced, integumental pigmentation absent.

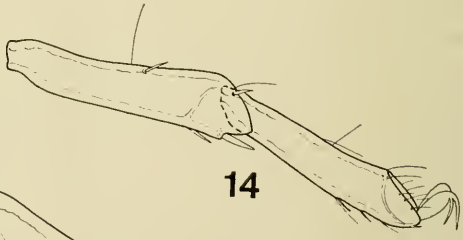
Dorsal lengths of the palpal segments: P-I, 24 μ (21–24 μ); P-II, 35 μ (34–35 μ); P-III, 20 μ (17–20 μ); P-IV, 36 μ (36–37 μ); P-V, 20 μ (17–20 μ); fig. 10 illustrates the proportions and chaetotaxy of the palp; dorsal lengths of the distal segments of the first leg: I-Leg-4, 64 μ (62–64 μ); I-Leg-5, 87 μ (86–87 μ); I-Leg-6, 103 μ (96–103 μ); fig. 9 shows I-Leg-5 and 6.

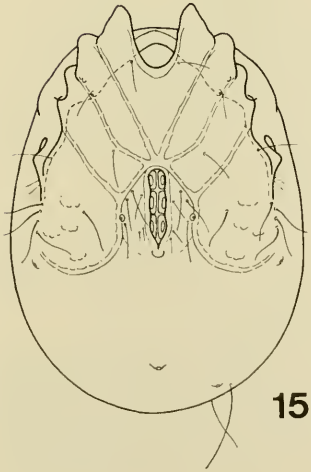
Types: Holotype, adult male, collected in a gravel bar in a stream near Twin Mountain, Coos Co., New Hampshire, August 21, 1964; allotype, adult female, from gravel deposits in a stream near Griffen (on Route #8, three miles from Warren Co. line), Hamilton Co., New York, August 18, 1964. Paratypes: two males, same data as holotype; one female, same data as allotype; one male, collected in a gravel bar in a small stream near Warm Springs, Bath Co., Virginia, July 16, 1963.

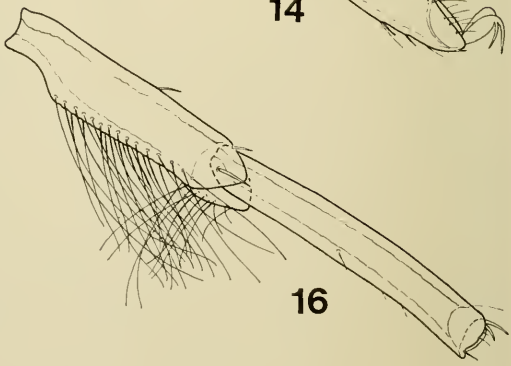












Figs. 11–15, *Volsellacarus sabulonus*, n. sp.: 11, ventral shield, ♀; 12, palp, ♀; 13, III-Leg-5 and 6, ♂; 14, I-Leg-5 and 6, ♀; 15, ventral shield, ♂. Fig. 16, *V. ovalis* Cook: III-Leg-5 and 6, ♂.

Discussion: The present species resembles the preceding species, *N. occidentalis*, in structure of the palp but may be easily distinguished as follows. The female of *minimus* differs from all previously described species of the genus in possessing a deep genital bay (fig. 6). Males of *minimus* and *occidentalis* may be easily separated by the structure of the third leg (figs. 3 and 8) and the morphology of the ventral shield. Males of *N. occidentalis* have a much deeper genital bay. *N. minimus* is also the smallest known species in the genus.

Volsellacarus sabulonus, n. sp.
(Figs. 11–15)

Male: Dorsal shield 638 μ in length, 456 μ in width; ventral shield, including first coxae, 718 μ in length, 517 μ in width; ventral shield oval; first coxae fused medially without a trace of a suture line medially; third and fourth coxae separated medially by the genital field; fourth coxae extending slightly posterior to the genital field; 4 long setae present on each side immediately posterior to the insertions of the fourth legs (fig. 15); genital field long and narrow, 138 μ in length; 3 pairs of elongated genital acetabula present, these occupying the opening of the gonopore; gonopore flanked by a pair of glandularia; eyes reduced, integumental pigmentation absent.

Dorsal lengths of the palpal segments: P-I, 50 μ; P-II, 88 μ; P-III, 52 μ; P-IV (including distoventral projection), 240 μ; P-V, 124 μ; structure of palp similar to that illustrated for the female; dorsal lengths of the distal segments of the first leg: I-Leg-4, 145 μ; I-Leg-5, 171 μ; I-Leg-6, 173 μ; dorsal lengths of the distal segments of the third leg: III-Leg-4, 180 μ; III-Leg-5, 221 μ; III-Leg-6, 201 μ; ventral side of III-Leg-5 with a slight bulge near proximal end, this bulge bearing a patch of short slightly-thickened setae (fig. 13); a few swimming hairs located at distal end of III-Leg-5.

Female: Dorsal shield 745 μ (684–745 μ) in length, 555 μ (498–555 μ) in width; ventral shield, including first coxae, 836 μ (764–836 μ) in length, 616 μ (578–616 μ) in width; ventral shield oval; first coxae fused medially without a trace of a median suture line; second and third coxae slightly separated medially; fourth coxae forming a shallow genital bay; genital field 183 μ (178–183 μ) in length, 166 μ (159–166 μ) in width; gonopore relatively large; 6 pairs of genital acetabula present on each side, these lying on elongated sclerites on their respective sides (fig. 11); acetabular sclerites fused with the ventral shield; eyes reduced, integumental pigmentation absent.

Dorsal lengths of the palpal segments: P-I, 67 μ (64–67 μ); P-II, 110 μ (104–110 μ); P-III, 64 μ (62–64 μ); P-IV (including distoventral projection), 322 μ (312–322 μ); P-V, 169 μ (162–169 μ); fig. 12 illustrates the proportions and chaetotaxy of the palp; dorsal lengths of the distal segments of the first leg: I-Leg-4, 173 μ (148–173 μ); I-Leg-5, 190 μ (180–190 μ); I-Leg-6, 180 μ (169–180 μ); fig. 14 shows I-Leg-5 and 6.

Types: Holotype, adult male, taken in a sand bar in a small stream five miles west of Marietta (on Alternate US 50), Washington Co., Ohio, July 26, 1964; allotype, adult female, from a gravel bar in a small creek six miles north of Millboro Springs, Bath Co., Virginia, July 24, 1964; paratype, one female, same data as allotype.

Discussion: This is the second known species in the genus *Volsellacarus*. It changes the original conception of the genus only in that the first coxae of the male may be pointed (fig. 15) rather than rounded as in *V. ovalis*. III-Leg-5 of the male, while without pronounced sexual dimorphism as in *Neoacarus*, does exhibit valuable specific characters. Figs. 13 and 16 illustrate III-Leg-5 and 6 of *sabulonus* and *ovalis* respectively. The new species is proportionally much narrower than *V. ovalis*.

Two species of *Neoacarus*, originally described from the Ozark and Rocky Mountain area, are now known to occur in eastern North America.

Neoacarus similis Cook: One male, from gravel deposits in a stream near Griffen (on Route #8, three miles from Warren Co. line), Hamilton Co., New York, August 19, 1964; one female, taken in a gravel bar in a small stream near Limestone, Victoria Co., New Brunswick, August 26, 1964; three males, one female, found in a gravel bar in the North Branch of the Meduxnekeag River at Monticello, Aroostook Co., Maine, August 28, 1964.

Neoacarus ozarkensis Cook: One male, taken in a gravel deposit in Knapp's Creek near Minnehaha Springs, Pocahontas Co., West Virginia, July 22, 1964; one male, two females, from gravel deposits in a stream near Griffen (on Route #8, three miles from Warren Co. line), Hamilton Co., New York, August 19, 1964.

References

Cook, David R. 1963. Studies on the phreaticolous water mites of North America: the family Neoacaridae. Ann. Ent. Soc. Amer. 56:481–487.

A NEW SPECIES OF LYGAEUS FROM PERU
(Hemiptera: Lygaeidae)

Leon J. Gorski, *Department of Zoology and Entomology, University of Connecticut, Storrs, Connecticut 06268*[1]

The genus *Lygaeus* Fabricius is the type genus of the family Lygaeidae and was originally used to include many species now in other heteropterous families as well as throughout the Lygaeidae. Attempts to better define the various genera of the Lygaeidae have resulted in the use of the phallus as a taxonomic character. Ashlock

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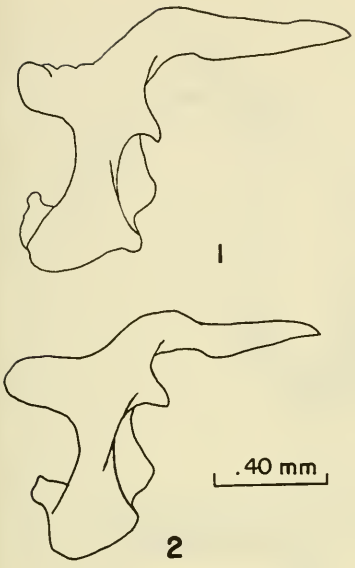

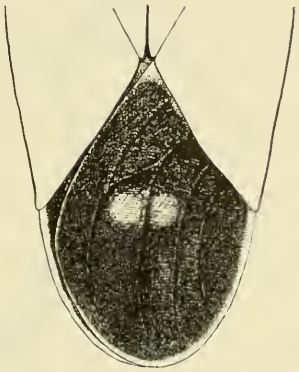

Figs. 1 and 3, *Lygaeus slateri*, n. sp.: 1, ♂ paramere; 3, membrane, dorsal view. Fig. 2, *L. inaequalis* Walker, ♂ paramere.

(1957) points out the value of the phallus for discrimination of the higher taxa in the Lygaeidae and as a secondary consideration the use of the sclerotized portions (parameres) for possible specific discriminations. It is the paramere or clasper characteristic which has been used primarily to define *Lygaeus slateri* n. sp. as a part of the revision of the entire genus.

The parameres are bilaterally symmetrical and relatively simple in *Lygaeus*. Three regions are definable on each paramere: the basal shank, the proximal hook, and the apical hook. The apical hook is arm-like with a curvature of varying intensity. This portion is always hollowed out along its inner surface. The basal shank also shows a varying type of concavity. The inner margin of the shank portion of the paramere exhibits many of the specific modifications. Specific differences can most readily be seen when the left paramere is oriented with the inner concave side dorsal. In this position one can see the concavity of the arm and shank as well as the outline provided by the presence or absence of processes, figs. 1 and 2.

Lygaeus slateri, n. sp.
(Figs. 1 and 3)

Head, anterior portion of pronotum, scutellum and distal abdominal segments grey-black; anterior half of clavus and posterior half of pronotum yellow-orange;

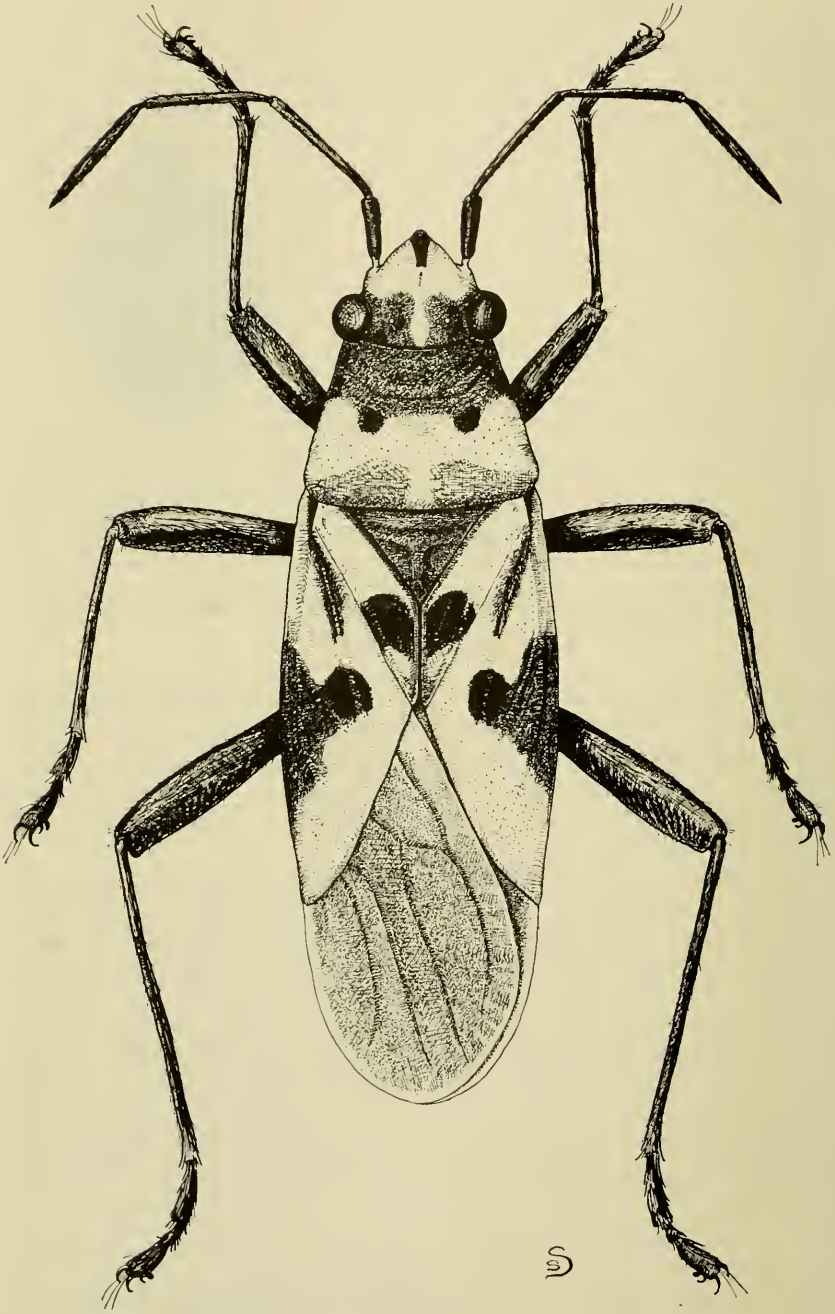

Fig. 4, *Lygaeus inaequalis* Walker, dorsum, ♂.

pro, meso and metapleura grey with exception of slight overlapping of yellow-orange from pronotum on upper margin of propleuron and with slight darkening along entire ventral midline; abdomen bright orange with yellow border along narrow edge of connexivum, also with 2 black spots on each segment of abdomen, 1 on the connexival border and 1 extending dorsally from the ventral midline. Ostiolar peritreme, antennae, legs, genital area and labium black.

Eyes large, occupying most of lateral surface of head, a prominent orange fascia extending from base of vertex as a narrow parallel sided band, branching anterior to eyes and extending laterally to include antenniferous tubercles; tylus with short white pilosity; ocelli located in area between eye and narrow median orange band. Head length 2.32 mm; width across eyes, 3.04 mm; interocular space, 2.40 mm.

Clavus with median black spot not attaining outer margin but merging with inner margin of clavus and extending to apex along inner margin, spot then meets outer margin of corium at the level of the claval apex. Scutellum with T-shaped carinae; length, 1.40 mm; width, 2.14 mm.

Membrane dark brown suffusing to black, veins concolorous with background of membrane. In addition, the membrane has 2 discal white spots in the center at the level of the apices of the corium; membranal margin white. Antennae relatively large and moderately thick, segments III and IV fusiform, labium elongate attaining metacoxae; length of antennal segments: I, .92 mm; II, 2.08 mm; III, 1.72 mm; IV, 2.24 mm.

Holotype: male; Contumefa, Peru–2700 M II–1950 (Weyrauch): USNM 69066.

Paratypes, same data as holotype: 1 male, J. A. Slater Collection, University of Connecticut; 1 female, USNM.

Close geographical and morphological relationship exists between *Lygaeus slateri* and *Lygaeus inaequalis* Walker 1872, (fig. 4). Externally the latter species lacks a pair of white discal spots which are quite conspicuous on the membrane of *slateri* (fig. 3). However, the paramere structure of these two species presents the most reliable diagnostic characteristic for identification. The major difference is in the angle of the dorsal projection from the shank which in *slateri* is more acute (fig. 1). In the arm of the paramere in *inaequalis* there is also a notch on the dorsal surface which is absent in *slateri* (fig. 2).

I have named this species for Dr. James A. Slater for sharing his knowledge of the Lygaeidae with me and also for extending both encouragement and criticism during this research.

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A NEW SPECIES OF PTEROMICRA AND OF EUTHYCERA FROM WESTERN NORTH AMERICA

(DIPTERA: SCIOMYZIDAE)[1]

L. V. KNUTSON[2] *and* JAN ZUSKA[3]

The species described here were discovered among material loaned to us by G. E. Shewell, Entomology Research Institute, Ottawa, Canada. Additional material was provided by B. A. Foote, Kent State University, Kent, Ohio.

Pteromicra rudis, n. sp.
(Figs. 1–4)

Male and female. Body length, 2.08 to 2.72 mm. All bristles and hairs (except aristal and squamal) black. Head slightly higher than long. Frons somewhat narrowed and much lighter anteriorly; slightly wider than long, shiny, yellowish brown, with scattered hairs. Orbital plates and ocellar triangle dark brown to black. Cheeks broad, about ½ height of eye, with several strong hairs, especially on ridge above oral margin. Face and cheeks yellow, with variable amount of silver to yellowish pruinosity. Occiput shiny black, slightly pruinose; area between occipital grooves and circumcervical area with denser silver pruinosity. One pair of ocellar bristles; 2 pairs of frontorbitals, anterior pair only slightly shorter than posterior pair; 1 pair of inner and 1 pair of outer vertical bristles; 1 pair of divergent postverticals. First and second antennal segments yellowish to brownish; third segment yellowish basally, brownish apically. Basal ¼ of arista thickened, somewhat lighter than dark brownish apical ¾; pilosity shorter than width of arista at base. Blackish orbito-antennal spot present. Proboscis black; labellae large, yellow; palpi yellow, with 1 or 2 long subapical bristles and several hairs.

Thorax black, faintly pruinose. Propleural bristle strong. Humeral bristle usually small; posthumeral large; anterior notopleural well developed; posterior notopleural ½ to ⅔ as large; 1 supraalar; 1 postalar; no presutural dorsocentrals; posterior postsutural dorsocentrals well developed, anterior pair ½ as large, some specimens with 1 or 2 pairs of large, subequal hairs before anterior dorsocentral bristles. Basal and apical scutellars well developed, apicals twice as large as basals. Mesopleuron bare, with dense yellowish or silver pruinosity around spiracle and remaining surface slightly pruinose (Colorado specimens) or very shiny (Montana specimens); pteropleuron with 2 or 3 weak to strong bristles; sternopleuron with many fine hairs. Prosternum yellowish white, densely pruinose.

Fore coxae elongate, silvery, pruinose, mesially with scattered hairs, anteriorly with 1 bristle at or just below middle and 1 subapical bristle; middle and hind coxae black with silver pruinosity; hind coxae bare posteromesially. Fore femora

[1] Research supported by National Science Foundation Grants GB-2415 and GB-5452.

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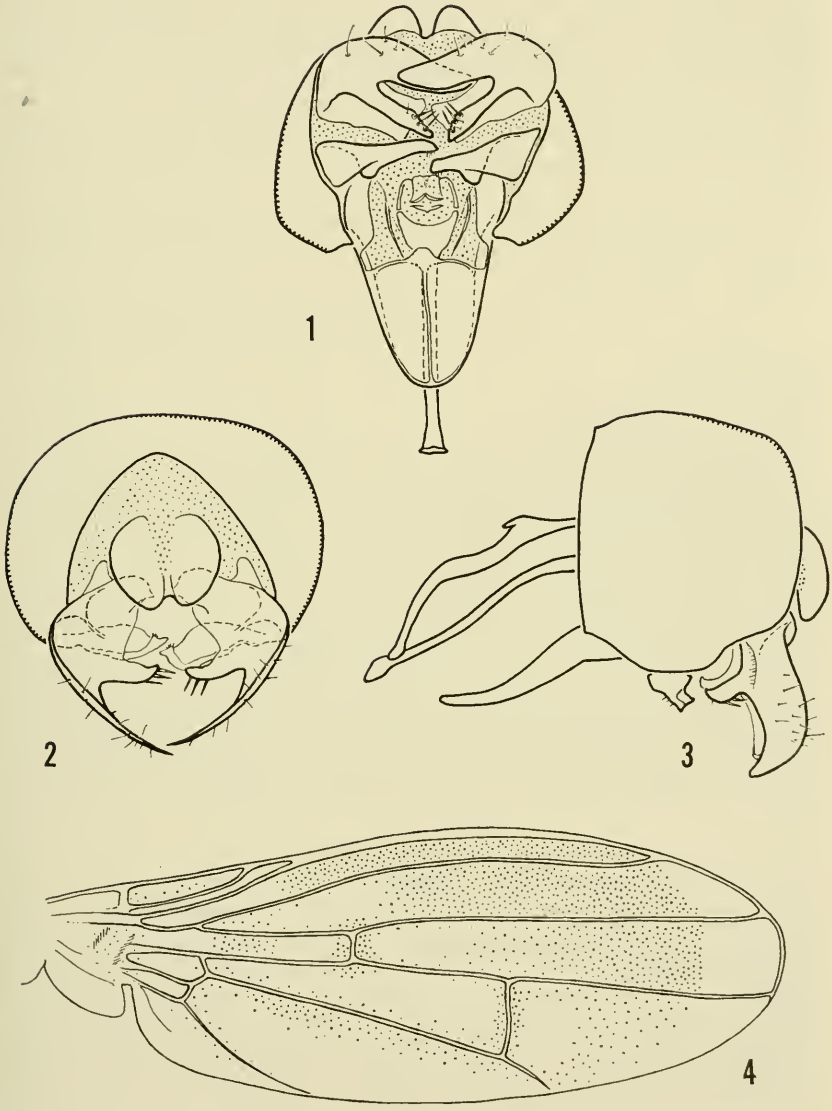

Figs. 1–4, *Pteromicra rudis,* n. sp.: 1, ♂ terminalia, ventral view, surstyli in natural position; 2, ♂ terminalia, caudal view, surstyli extended; 3, ♂ terminalia, lateral view of left side, surstyli slightly more extended than in fig. 2; 4, wing.

black, without pecten but with several strong hairs ventromesially at apex; middle and hind femora black, sometimes brownish apically; middle femora with strong bristle beyond middle on anterior surface. Fore tibiae black; middle and hind tibiae yellowish to brownish, sometimes darkened apically; each tibia with 1 strong, dorsal preapical bristle. Fore tarsi black; apical half of last segment yellowish; middle and hind tarsi yellowish, last 2 segments slightly darker.

Wings (fig. 4) 1.92 to 2.28 mm long, mostly darkened, lighter basally and apically. First vein ending above or slightly before anterior crossvein; anal vein extending to margin, weak apically. Halteres yellow, squamae dusky with brownish hairs.

Abdomen black, subshiny, with sparse silver pruinosity. Female cerci yellowish. Male genitalia, figs. 1–3. Anterior surstyli strongly flexed dorsomesially, usually not visible in lateral view.

Holotype.—Male. About 9 mi. SW Lima, Beaverhead Co., Montana; 14–VIII–1965; B. A. Foote. In Cornell University Collection, CU type number 4410.

Allotype.—Female. Same data. In Cornell University Collection, CU type number 4410.

Paratypes.—One male, one female; Doolittle Ranch, 9800′, Mt. Evans, Colorado; 3–VIII–1961; W. R. M. Mason. One male, one female; same locality; 15–VII–1961; C. H. Mann. One male; 5 mi. SW Idaho Springs, Colorado; 8600′; 27–VII–1961; C. H. Mann. In Canadian National Collection, Ottawa.

The habitat near Lima, Montana where B. A. Foote collected this species is located at the edge of East Creek Campground (elevation 7,200 feet) and consists of small, partially shaded, grass-sedge stands scattered among dense growths of willows along a small creek. Other Sciomyzidae occurring there were *Pherbellia argyra* Verb., *P. schoenherri maculata* (Cress.), *P. vitalis* (Cress.), *Dictya montana* Stey., *Tetanocera rotundicornis* Lw., and *T. spirifera* Mel. (B. A. Foote, *in litt.*).

Pteromicra rudis apparently is the only known member of the genus with a somewhat patterned wing, the other species having at most infumated veins. This tiny, black species is similar to *P. anopla* Steyskal, *P. perissa* Steyskal, and *P. inermis* Steyskal and most obviously different from the remaining species in lacking a pecten at the apex of the fore femur. The yellow palpi, entirely black fore femora, and presence of anterior surstyli distinguish *P. rudis* from the brownish and larger *P. anopla*, which has black palpi, mainly yellow fore femora and lacks anterior surstyli. *Pteromicra inermis* is usually much larger than *P. rudis* and the basal ⅓ or ¼ of the fore femora is yellowish. *Pteromicra perissa*, a very small species known from 1 male from Colorado, has the basal segments of the fore tarsi pale whereas in *P. rudis* they are black; the male genitalia of these two species are quite different.

Pteromicra rudis has several atypical features. The cheeks are relatively much wider (½ of the height of the eye) than any other described *Pteromicra* and in this regard are similar to several other genera of Sciomyzini. Although the shiny nature of the body, especially of the mesopleuron and pteropleuron, has been used as a key character for *Pteromicra* by many workers, the thoracic pleura of some specimens of *P. rudis* (those from Colorado) have a distinct pruinosity. Available data indicate that the described species of *Pteromicra* have two postsutural dorsocentral bristles. Some specimens of *P. rudis* have, in addition, one or two strong hairs or weak bristles between the thoracic suture and the anterior pair of postsutural dorsocentrals.

Pteromicra rudis may be included in the recent key to Nearctic species by Foote, (1959) as follows.

Couplets 1–2 are unchanged.

3. Fore femora yellowish on basal one-fourth to one-third ..... **inermis** Steyskal
   Fore femora completely black 3a

3a. Fore tarsi pale basally; wing not patterned; posterior surstylus without process on anterior margin ..... **perissa** Steyskal
   Fore tarsi black basally; wing patterned; posterior surstylus with process on anterior margin ..... **rudis** Knutson and Zuska

Couplets 4–13 are unchanged.

Subsequent to the revision of *Pteromicra* by Steyskal (1954), five additional North American species have been described in this genus, and one of Cresson's species has been resurrected from synonymy (Steyskal, 1956, 1957; Foote, 1959; Fisher and Orth, 1966). A total of 16 species, including the new one described above, thus have been reported from North America. Three of these (*P. glabricula* (Fallén), *P. leucopeza* (Meigen), and *P. pectorosa* (Hendel) have an Holarctic distribution. Three more species are known only from the Palearctic Region.

Euthycera mira, n. sp.
(Fig. 5)

Male. Body length, 8.0 mm. All bristles and hairs (except aristal and squamal) black. Head slightly longer than high, conspicuously protrudent anteriorly. Frons slightly convergent posteriorly, about 1.5 times as wide as distance between anterior ocellus and anterior margin, mostly dull yellow, brownish around midfrontal stripe. Midfrontal stripe shiny, concave, acuminate anteriorly, almost reaching anterior margin of frons. Frons with several short hairs near anterior margin, a few hairs on orbital plates. Two pairs of subequal frontorbital bristles; anterior pair situated on large, velvety-black oval spots which are about as long as widest part of midfrontal stripe. One pair each of ocellars, internal verticals, and external verticals; postocellars long, divergent. Ocellar triangle shiny, dark brown. Occiput with a few rather long bristles, patch of short hairs above cervix, and cordate black spot below postocellar bristles about twice as wide as greatest width of midfrontal stripe. Orbito-antennal spot well developed. Facies, parafacies, and cheeks pale yellow; facies subshiny, with sharp carina in upper part

Fig. 5, *Euthycera mira,* n. sp., holotype ♂.

and sharply delimited, shiny, black, cordate spot above middle, spot with apex directed dorsally and about 0.8 of maximum width of midfrontal stripe. Epistoma distinctly protrudent anteriorly. Parafacies with a few, fine, scattered hairs and row of sparse, short hairs on anteroventral margin. Cheeks about 0.6 times height of eyes; with very short, fine, scattered hairs and with 3 large bristles along lower margin. Eyes 1.6 times as long as high, maximum diameter slightly oblique. Lunula strongly exposed, shiny, brownish reticulate. Antennae yellowish, about two-thirds as long as head including lunula. First segment short, brownish yellow, with transverse row of tiny hairs dorsally. Second segment compressed laterally, 1.4 times as long as wide, yellowish ventrally, brownish reticulate dorsally; dorsal surface with rather long hairs and several long bristles; ventral surface with long hairs; dorsal margin sharp, almost straight, ventral margin smooth and distinctly convex. Third segment 0.8 times as long and 0.8 times as wide as second, oval, yellow basally, darkened toward apex, almost black dorso-apically. Arista subbasal, yellow, about as long as antenna, basal fifth thickened, remainder hairy and with whitish proclinate hairs about as long as width of arista at base. Pro-

boscis yellowish brown; labellae large; palpi yellow, spatulate, with a few long hairs.

Thorax brownish, mostly dull and strongly pruinose. Mesonotum in posterodorsal aspect with 2 indistinct brown vittae separated by distance half as wide as frons. Pair of brown spots posteromesially from humeral calli, on bases of posthumeral and supraalar bristles, and smaller spots around bases of other mesonotal bristles. Mesonotum densely covered with very short, strong hairs situated on small brownish spots. Indistinct prescutellar spot mesially. Scutellum brown, shiny mesially, borders pruinose; pair of velvety blackish spots on posteroventral margin. Prosternum and pleura, except for propleura and sternopleura, bare with whitish pruinosity. Propleura with a few hairs on lower surface, sternopleura with bristles on lower surface and hairs on upper surface. Humeral calli, upper part of mesopleura, and greater part of pteropleura dark brown, shiny to subshiny. One prescutellar pair of acrostichal bristles; 2 pairs of postsutural dorsocentrals situated on posterior half of postsutural part; 1 pair each of humerals, posthumerals, and supraalars; 2 pairs of notopleurals and postalars; 2 pairs of long scutellars, distance between basals and apicals slightly more than distance between apicals. No pleural or vallar bristles.

Legs yellowish, brownish, and black. All coxae brownish yellow, pruinose. Femora brownish yellow, apices black. Posterior femora with irregular, suberect hairs and bristles ventrally. Tibiae yellowish, apices black. Preapical bristles of all legs about as long as apical width of tibiae. Basal 2 segments of tarsi translucent white, apical half or entire third segment and 2 apical segments blackish. Claws with whitish bases and black apices.

Wings 8.5 mm long, densely patterned, white spots mostly subcircular, pattern slightly darker before r_3 than behind r_3, white spots between r_5 and m in 3 rows. Halteres brownish yellow.

Abdomen long, slender, in dorsal aspect only slightly tapering posteriorly, densely pruinose except for large, subshiny protandrium and small, subshiny epandrium. Median stripe indistinct; lateral stripes diffuse, interrupted. Fifth tergum half as long as fourth tergum.

Holotype.—Male. 14 mi. SW El Salto, Durango, Mexico; 8,000′; 26–VI–1964; J. F. McAlpine. In Canadian National Collection, Ottawa, Ontario.

Euthycera mira can be distinguished easily from other known species of this genus by the large, sharply delimited, shiny black spot on the face, and by the unusual coloration of the legs. The differences between this new species and *Euthycera arcuata*, the other North American species, are as follows:

Face without black spot. Black, cordate, occipital spot absent. Aristal hairs at least twice as long as basal width of arista. Legs yellow, without distinct annulations. Wings with 2 rows of white spots between veins r_5 and m ..... **Euthycera arcuata** (Loew)

Face with large, shiny black spot. Occiput with cordate black spot. Aristal hairs as long as basal width of arista. All femora, tibiae, and tarsi black or blackish apically. Wings with 3 rows of white spots between r_5 and m ..... **Euthycera mira** Knutson and Zuska

While only two species are now known from North America, in the Palearctic Region there are at least eight species referable to this genus and several poorly known species presently included under *Limnia* Robineau-Desvoidy also may belong to *Euthycera*. The presence of vallar (subalar) bristles and mesopleural hairs in *Limnia* serve to distinguish that genus from *Euthycera*.

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FURTHER RECORDS OF APHIDS FROM PLUMMERS ISLAND, MD.

(Homoptera: Aphididae)

An annotated list of the aphids of Plummers Island, Maryland, was published by the writer in Proc. Biol. Soc. Wash. 79:117–126, 1966. The following records were not available for inclusion in this paper.

Dactynotus (*Dactynotus*) *ambrosiae* (Thomas). This common and widespread species, the brown ambrosia aphid, was represented in the list only by McAtee's collection in 1914 on *Solidago* sp. A number of alatae and apterae were collected by Geo. B. Vogt, 11 Aug. 1964, on *Ambrosia trifida* (A. T. Olive det.).

Dactynotus (*Lambersius*) *gravicornis* (Patch). Not in the previous paper. A number of alatae and apterae were collected by Geo. B. Vogt, 11 Oct. 1964, on *Solidago* sp. (A. T. Olive det.) Second record for Maryland, the first being College Park, Sept. 1951 (W. E. Bickley coll.—L. M. Russell det.; 2 slides in USNM).

Dactynotus (*Lambersius*) *pseudambrosiae* Olive. Not in the previous paper; first record for Maryland. A number of alatae and apterae were collected by Geo. B. Vogt, 27 Sept. 1964, on *Lactuca biennis* and 18 Oct. 1964, on *L. canadensis* (A. T. Olive det.).

Dactynotus (*Uromelan*) *ruralis* (Hottes & Frison). Alatae and apterae collected by Geo. B. Vogt, 16 Aug. 1964, on *Actinomeris alternifolia* (A. T. Olive det.).

Drepanaphis saccharini Smith & Dillery. This is referred to in the previous paper as "*Drepanaphis* near *parvus* Smith, probably n. sp., 25 June 1964 on suckers of silver maple" (Geo. B. Vogt coll.—C. F. Smith det.).—Mortimer D. Leonard, *2480 16th St., Washington, D. C. 20009.*

THE GENUS EULABIDOCARPUS LAWRENCE
(ACARINA: LISTROPHORIDAE)[1]

B. MCDANIEL, *Department of Entomology–Zoology, South Dakota State University, Brookings, South Dakota 57006*

The genus *Eulabidocarpus* Lawrence (1948) was erected for the single species *Labidocarpus compressus* Ewing. In that publication detailed information as to the curious features of Ewing's *L. compressus* was given. Lawrence, however, clearly stated that all of his studies were taken from two descriptions by Ewing (1910, 1929). The illustrations of *L. compressus* by Ewing are extremely generalized and as Lawrence so clearly stated, the species as described and illustrated by Ewing makes it impossible to place this species in the genus *Labidocarpus* Trouessart.

Only by reference to the holotype, which now appears to be lost, could *E. compressus* (Ewing) be conclusively recognized. The author has tried unsuccessfully to secure the holotype or other material of *L. compressus* Ewing. E. W. Baker (personal communication) has informed the author that the holotype or other material of *L. compressus* Ewing cannot be found, either in Ewing's type collection or in the U. S. National Museum collection.

It was apparent that Lawrence (1948) in establishing the genus *Eulabidocarpus* for Ewing's *L. compressus* was removing from *Labidocarpus* this poorly illustrated and described species. It is also apparent that the genus *Eulabidocarpus* should remain monotypic, at least until additional material could be collected from the type host and the genus redescribed from actual specimens rather than the literature. In essence the single species *E. compressus* (Ewing) should be regarded as a *species inquirendae*—i.e. a species, the taxonomic position of which is in doubt because of difficulties in identifying the species.

Unfortunately this interpretation has not been followed by the work of Pinichpongse (1963c). He has added two new species to the genus *Eulabidocarpus* Lawrence. The genus *Eulabidocarpus* is redescribed by Pinichpongse (1963c) based on the two new species *E. flexipes* and *E. rectipes*. The structures which prompted Lawrence to establish *Eulabidocarpus* are not utilized. In Pinichpongse's review of a subfamily which he called Chirodiscinae,[2] he (1963a, b, c, d) apparently overlooked the work of McDaniel and Lawrence (1962) in which the genus *Parakosa* McDaniel and Lawrence was described.

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[1] Approved by the director of the South Dakota Agricultural Experiment Station as Journal Series No. 796.

[2] The use of the subfamily Chirodiscine is not valid due to the findings by McDaniel (in press).

In the revised description of *Eulabidocarpus* by Pinichpongse (1963c) he refers to legs III and IV as having a "large denticulated spur" in addition to spurs. This is one of the distinctive structures used to characterize the genus *Parakosa*. Also in the redescription of *Eulabidocarpus* it is stated that "Legs III and IV distinctly separated from legs I and II." This statement is very misleading if it was meant to utilize Lawrence's character of the third and fourth pair of legs forming a separate group far removed from the modified anterior legs, and placed near the posterior end of the body. In all members of the superfamily Listrophoroidea, legs III and IV are distinctly separated from legs I and II.

Dusbabek and Cruz (1966) collected *E. flexipes* Pinichpongse from a subspecies of the type host, *Molossus major tropidorhynchus* from Cuba. In this work the authors placed *E. flexipes* Pinichpongse in the genus *Parakosa* McDaniel and Lawrence by comparing their material from *Molossus major tripidorhynchus* with the description of *Parakosa*. Also Dusbabek and Cruz (1966) rightfully pointed out the difference in the host relationship of *E. compressus* Ewing and *E. rectipes* Pinichpongse. They also illustrated and described the copulatory nymph and larva of *Parakosa flexipes* (Pinichpongse).

Through the courtesy of Drs. E. W. Baker and R. E. Crabill, the author was able to study the holotypes, allotypes and paratypes of *E. flexipes* Pinichpongse and *E. rectipes* Pinichpongse. From this study it became clear that *E. rectipes* also belongs in the genus *Parakosa*.

Parakosa rectipes (Pinichpongse), n. comb.

Eulabidocarpus rectipes Pinichpongse, 1963, Acarologia 5(3):400.

The presence of the spine (thick seta of Pinichpongse) in addition to spurs on legs III and IV, the two long, thick subequal setae inserted above legs III, and two thick setae posterior to head plate, are found on *P. rectipes*.

The removal of *Parakosa rectipes* (Pinichpongse) makes *Eulabidocarpus* Lawrence monotypic. Until additional material can be obtained from the type host and the genotype *E. compressus* redescribed, it is the author's strong opinion that *Eulabidocarpus* should remain monotypic.

The genus *Parakosa* McDaniel and Lawrence now contains three species, *P. tadarida* McDaniel and Lawrence, *P. flexipes* (Pinichpongse) and *P. rectipes* (Pinichpongse). All are from the Neotropical region of the Western Hemisphere and found on bats of the family Molossidae of the suborder Microchiroptera.

KEY TO THE SPECIES OF **Parakosa** MCDANIEL AND LAWRENCE

1. Spur of tarsus IV distally curved toward claw and with pointed apex ..... **P. flexipes** (Pinichpongse)

Spur of tarsus IV not distally curved toward claw and either rounded or pointed at apex 2

2. Spur of tarsus IV broad, with inner margin curved, and beset with furrows ..... **P. rectipes** (Pinichpongse)

Spur of tarsus IV slender, setae-like, and straight, without furrows ..... **P. tadarida** McDaniel and Lawrence

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PRIORITY OF THE GENERIC NAMES TONNOIRIA MALLOCH AND TONNOIRIA PARENT

(Diptera)

The generic name *Tonnoiria* was proposed twice in July 1929, once by J. R. Malloch (Ann. Mag. Natur. Hist., ser. 10, vol. 4, p. 98) for a species of Clusiidae from the Society Islands and once by O. Parent (Ann. Soc. Sci. Bruxelles, sér. B, vol. 49, seconde partie, p. 184) for a species of Dolichopodidae from South America. The priority of these proposals has been undecided so far; Neave's Nomenclator lists the dates of both as simply "1929."

I am indebted to the library staff of the Smithsonian Institution's Museum of Natural History for the following information. The paper by Parent is in a part of the journal bearing the imprint "July 24, 1929." The Malloch paper bears the imprint "July, 1929." However, the number of the issue in which Malloch's paper appeared was received in the Smithsonian library on July 12, 1929 and must therefore have appeared very early in the month, which would make Malloch's name prior to that of Parent. Workers in South American Dolichopodidae may decide whether or not a replacement name is needed.—George C. Steyskal, *Systematic Entomology Laboratory, U. S. Department of Agriculture, Washington, D. C. 20560.*

A NEW SPECIES OF BALDULUS FROM GAMAGRASS IN EASTERN UNITED STATES WITH ITS POSSIBLE IMPLICATIONS IN THE CORN STUNT VIRUS PROBLEM

(HOMOPTERA: CICADELLIDAE: DELTOCEPHALINAE)

JAMES P. KRAMER *and* ROBERT F. WHITCOMB, *Entomology Research Division, ARS, U. S. Department of Agriculture*[1]

A new and apparently widespread leafhopper of possible economic importance has been discovered in the eastern United States. The new species belongs to the genus *Baldulus* Oman, previously known only from southwestern United States and Mexico. *Baldulus* and its close relative, *Dalbulus* DeLong, were revised by DeLong (1950).

Baldulus tripsaci, n. sp.
(Figs. 1–7)

Length: Males 3.0–3.6 mm. Females 3.8–4.1 mm.

Structure: Typical of genus in all respects (figs. 5–6).

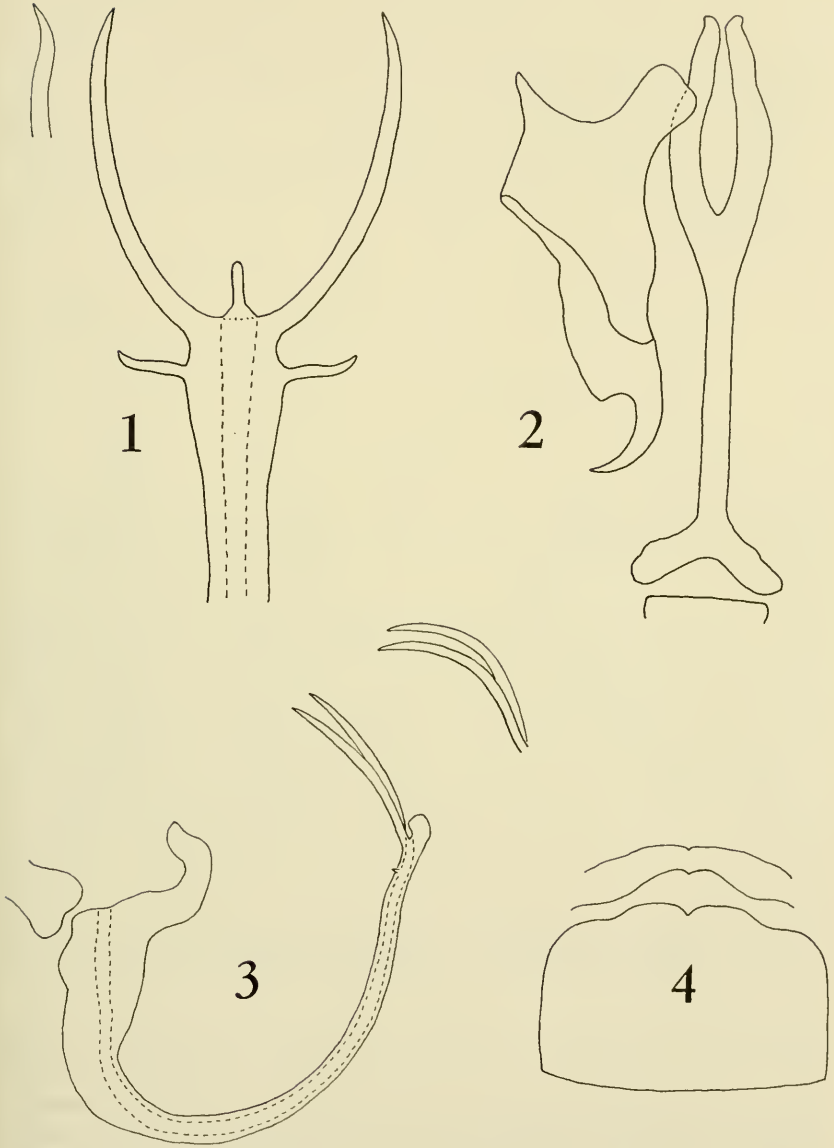
Coloration: Somewhat variable, ground color ranging from pale stramineous to light greenish yellow, females usually paler than males, both sexes at times partly washed with orange giving a bicolored appearance to crown and pronotum, each ocellus pale and often with an irregular orange halo, forewings hyaline or nearly so with veins same hue as ground color, males at times with veins of clavus and costal area washed with orange, both sexes without brown or black markings of any sort.

Male genitalia: Connective (fig. 2) with stalk very long and forked distally at juncture with aedeagus; style (fig. 2) with mesal lobe long, turned laterad, and tapering to a sharp point; aedeagus in lateral view (fig. 3) irregularly U-shaped, broadest basally with shaft greatly narrowed, extreme apex knobbed with 2 pairs of preapical processes arising from dorsal margin, distal processes long, simple, upright or recurved, proximal processes short and barely visible, gonopore anterior to apical knob; aedeagus in posterior view (fig. 1) with apical knob narrowed and rounded, longer pair of processes directed dorsally and together forming a U-shaped arch, shorter processes directed laterally and somewhat undulated on their dorsal margins.

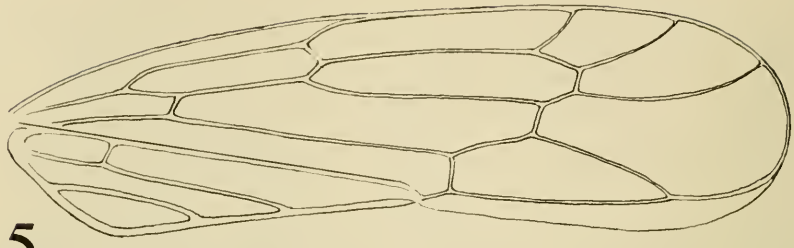
Female genitalia: Posterior margin of pregenital sternum (fig. 4) somewhat variable, usually produced on middle half with a central notch.

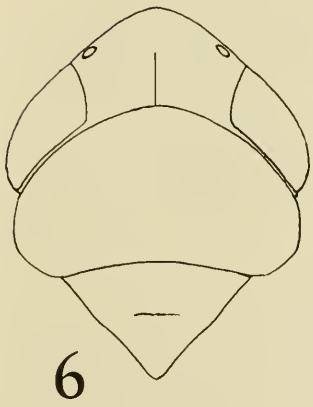
Types: Holotype male (USNM 69761) and allotype female, Beltsville, Maryland [Soil Conservation Road between Beaver Dam Road and Goddard Space Center], 6 October 1967, R. F. Whitcomb. Paratypes: 13 males, 22 females, and 3 nymphs, same data as holotype; 2 males, Beltsville, Maryland [Junction U. S. Route 1 and Ammendale Road], 15 August 1967, R. F. Whitcomb; 6 males and 12 females, same data as preceding except 8 September 1967, R. F. Whitcomb and A. Moore; 1 male and 5 females, Great Falls near Potomac, Mary-

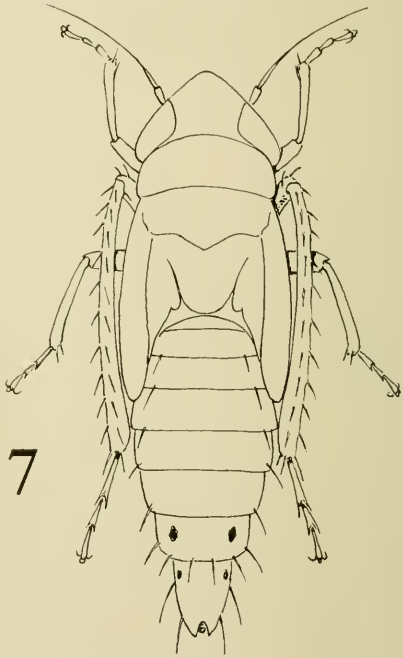
[1] Systematic Entomology Laboratory, Washington, D. C. 20560 and Beltsville, Maryland 20705, respectively.



Figs. 1–4. *Baldulus tripsaci*, n. sp. Fig. 1, aedeagal apex in posterior view, upper left variation in process; fig. 2, connective, style, and basal tip of aedeagus in dorsal view; fig. 3, aedeagus and apical tip of connective in lateral view, upper right variation in processes; fig. 4, female pregenital sternum (flattened on slide), with variations in posterior margin above.







Figs. 5–7. *Baldulus tripsaci*, n. sp. Fig. 5, right forewing; fig. 6, head, pronotum, and scutellum in dorsal view; fig. 7, fifth instar nymph in dorsal view.

land, 20 September 1967, J. P. Kramer and R. F. Whitcomb; 1 male and 5 females, Churchton, Maryland, 23 September 1967, R. F. Whitcomb; 4 males, 18 females, and 2 nymphs, Benton (Lowndes County), Alabama, 12 October 1967, H. B. Cunningham and T. D. Eichlin. Entire type series collected on *Tripsacum dactyloides*, eastern gamagrass.

Notes: The species is named for its host grass, *Tripsacum dactyloides*. The name "*tripsaci*" is the genitive singular of *Tripsacum*.

Baldulus tripsaci can be distinguished easily from all its congeners

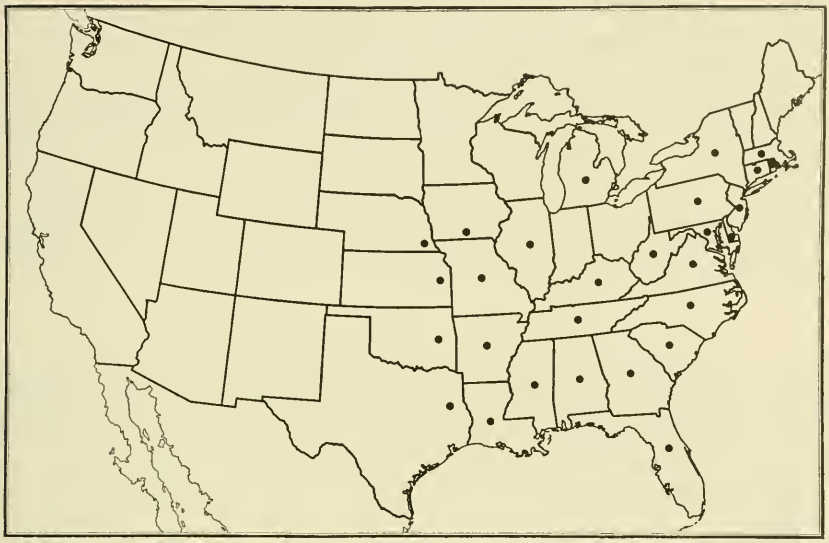


Fig. 8. Distribution of eastern gamagrass, *Tripsacum dactyloides,* in the United States (after Hitchcock).

by the fact that it lacks black or brown spots on the crown and brown stripes on the pronotum. The male genital structures are closest to those of the Mexican *Baldulus bilineatus* DeLong (DeLong 1950: plate III). The styles of *B. tripsaci* and *B. bilineatus* are nearly identical, but the stalk of the connective is very much longer in *B. tripsaci.* The aedeagus of *B. tripsaci* is clearly U-shaped with the proximal pair of apical processes much shorter than the distal pair; the aedeagus of *B. bilineatus* is scarcely or not U-shaped, and the two pairs of apical processes are subequal in length. Because the connective is unusually long, the distal portion of the aedeagus often protrudes dorsally from the genital capsule in *B. tripsaci.* The aspect of the aedeagus shown in fig. 1 can be observed frequently by viewing the genital capsule from above without resorting to the usual clearing procedures.

The fifth instar nymph (fig. 7), length 2.5–3.0 mm, resembles the adult but has a pair of irregular black spots dorsally on each of the last two abdominal segments and paired setae on all abdominal segments.

Another leafhopper, *Amplicephalus lawsoni* (DeLong), was also found to breed abundantly on eastern gamagrass in Maryland. This species had been recorded previously from Kansas and Mississippi, but its host grass was unknown. *A. lawsoni* and *B. tripsaci* coexist on the same host grass, and the two species were often collected together. The infrequency with which *A. lawsoni* had been collected in the past and the discovery of *B. tripsaci* can be explained in part by a high

host plant specificity. Gamagrass is difficult to sweep, at least at the stage when the grass can be positively identified; and even though its distribution is extensive, gamagrass is not often common (Hitchcock 1935: 767). Both leafhoppers belong to the exceedingly large subfamily Deltocephalinae, but they are in distinctly different tribes. *A. lawsoni* is a conspicuous, robust, distinctly marked, brown leafhopper in the tribe Deltocephalini; *B. tripsaci* is an inconspicuous, slender, fragile, unmarked yellowish leafhopper in the tribe Macrostelini. With the unaided eye alone, *B. tripsaci* could be mistaken easily for a typhlocybine leafhopper.

Probable Distribution and Economic Implications

The distribution of the grass *Tripsacum dactyloides* (fig. 8) includes most of eastern United States westward to the eastern portions of the Great Plain states south of the Dakotas. This indicates that *B. tripsaci* will eventually prove to have a much wider distribution than is presently recorded and may occur wherever *Tripsacum dactyloides* is found.

Eastern gamagrass, *Tripsacum dactyloides*, and corn, *Zea mays*, are known to be closely related because these two grasses hybridize (Mangelsdorf and Reeves 1931). Also, *Dalbulus maidis* (DeLong and Wolcott), whose host plant is corn, is closely related to *B. tripsaci* and is the major vector of corn stunt virus in many parts of the southern United States (Stoner 1965). However, some leafhoppers are known to change hosts: Whitcomb (1957) reported three species transferred from *Elymus* grasses to quackgrass, *Agropyron repens*, in the midwest. Thus on the basis of the close relationship between *D. maidis* and *B. tripsaci* and their host grasses and with the precedent for a change in host plants by other leafhoppers, *B. tripsaci* may eventually be implicated, either directly or indirectly, in the corn stunt virus problem. *Tripsacum dactyloides* could well harbor a virus that is intraspecifically transmitted by *B. tripsaci* and that may be transmitted interspecifically to corn.

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DeLong, D. M. 1950. The genera *Baldulus* and *Dalbulus* in North America including Mexico (Homoptera: Cicadellidae). Bull. Brooklyn Ent. Soc. 45(4): 105–116.

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Stoner, W. N. 1965. A review of corn stunt disease (Achaparramiento) and its insect vectors, with résumés of other virus diseases of maize. U.S. Dept. Agr., ARS 33–99:1–35.

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SUMMARY REPORTS OF SOCIETY OFFICERS FOR 1966[1]

CORRESPONDING SECRETARY

(For the fiscal year 1 November 1965 to 31 October 1966)

Membership on 1 November 1965		484
Reductions:		
Resigned	19	
Dropped	6	
Deceased	4	
Total	29	
Increases:		
Elected to Membership	25	
Reinstated	2	
Total	27	
Membership on 31 October 1966		492
Classes of Membership:		
Dues Paying	468	
Life	5	
Retired	15	
Honorary	4	
Total	492	

The membership is distributed among 47 states, the District of Columbia, 2 territories, and 22 foreign countries.

Circulation of the Proceedings (September 1966 issue):		
States	527	
District of Columbia	91	
U. S. Possessions	10	
Foreign Countries	178	
Total		806
Distribution of the Proceedings (September 1966 issue):		
To members	474	
To subscribers	332	
Total		806

The *Proceedings* go to members and subscribers in 50 states, the District of Columbia, 2 territories, and 51 foreign countries. D. M. ANDERSON, *Corresponding Secretary.*

TREASURER

(For the period 1 November 1965 to 31 October 1966)

	General Fund	Publications Fund	Total Fund
Cash on Hand November 1, 1965	$1,126.02	$10,492.12	$11,618.75
Plus **Receipts**	6,493.63	708.67	7,202.30
Total	$7,620.26	$11,200.79	$18,821.05
Minus **Expenditures**	6,018.74		6,018.74
Cash on Hand October 31, 1966	$1,601.52	$11,200.79	$12,802.31

Respectfully submitted, ARTHUR K. BURDITT, JR., *Treasurer.*

[1] Due to the loss of these reports in shipment to the printer, publication was withheld until now.—Ed.

CUSTODIAN

(For the period 1 November 1965 to 31 October 1966)

The value of stock sold by the Custodian's office amounted to $1,352.20. Of these items, $170.20 was for 25 copies of the *Memoirs*, $4.00 for 2 copies of the Weld volumes, $678.00 for complete volumes and miscellaneous numbers of the *Proceedings*, and $500.00 for miscellaneous reprints.

Sales of the *Memoirs* were: No. 1, 1 copy; No. 2, 2 copies; No. 3, 6 copies; No. 4, 9 copies; No. 5, 7 copies.

A copy of the complete, detailed report is on file with the Recording Secretary. Respectfully submitted, ROBERT L. SMILEY, *Custodian.*

EDITOR

(For the calendar year 1966)

Four numbers of the *Proceedings* were published in 1966. Of the pages published, four were devoted to advertising and 338 to scientific papers, notes, obituaries, book reviews, minutes of meetings, and announcements. Eighty-seven scientific papers and notes were published during the year. The Society and the Proceedings benefitted from five paid papers of 32 pages. This did not cause the articles of regular contributors to be postponed. Respectfully submitted, JON L. HERRING, *Editor.*

SOCIETY MEETINGS

752nd Regular Meeting—May 4, 1967

The meeting was called to order by President Louis G. Davis at 8 p.m. at the regular meeting place, Room 43, United States National Museum. Twenty-two members and eighteen visitors were present. Minutes of the 751st were approved as read.

Three applications for membership were presented: *Robert Hamman, Norman Lin* and *Elliot Krafsur.* President Davis announced that Dr. Frank Favorite will speak at the Joint Dinner on June 1.

Visitor David Gilsey announced the National Audubon camp in a nearby state during the summer.

Under notes and exhibition of specimens, T. L. Bissell mentioned the collecting of two species of aphids, apparently common, on barley and wheat.

L. G. Davis showed a piece of wood damaged by *Coptotermes formosanus,* the Formosan termite. He said this potentially serious pest is now established in two localities in the State of Louisiana. In Hawaii it is especially injurious to utility poles.

As part of the program three high school students presented their science fair exhibits with which they had won awards in their respective areas. The students and their subjects were: Patrick Hughes, LaPlata, Maryland, "Relationships in Entomology"; George Roland, Brandywine, Maryland, "A 2-D Chromatography Study of Drosophila Pteridine Metabolism"; and Bruce C. Black, Falls Church, Virginia, "Effects of Mono, Di and Tri Saccharides on the Activities of Honey Bees." Each explained his subject in well-prepared detail.

The principal speaker of the evening was Dr. Adolph Krebs trained at Universities of Heidelberg, Bonn and Frankfurt a. Main, and presently at the Walter Reed Army Institute of Research, Division of Nuclear Medicine. Dr. Krebs' subject, "Ionizing Radiation and Ants," was illustrated by a motion picture and slides. Interesting comparisons were made between ants and other organisms as to their reactions to radiation. Respectively submitted, THEO L. BISSELL, *Acting Recording Secretary.*

753rd Regular Meeting—June 1, 1967

The 753rd meeting of the Society was held jointly with the Insecticide Society of Washington in the Fort McHenry Room of the Adult Education Center, University of Maryland, College Park. About 180 persons were present. After a delicious dinner served by University students, members and their friends were entertained by a group of four young men who performed "Eine Kleine Nachtmusik." The principal speaker of the evening, Dr. Frank G. Favorite, Space Science Board, NAS-NRC, presented the fascinating story of space biology studies carried on by United States scientists. The meeting adjourned at 9:45 p.m. Respectfully submitted, RICHARD H. FOOTE.

754th Regular Meeting—October 5, 1967

The 754th regular meeting of the Society was called to order by the President, Mr. Louis G. Davis, on October 5, 1967 at 8:00 p.m. in room 43, U. S. National Museum. Twenty-four members and seven visitors were in attendance. Minutes of the previous meeting were approved as read. *Elliot S. Krafsur, Robert E. Hammon,* and *Norman Lin* were received into the Society. The names of *Maynard*

J. Ramsey, Cary J. Hansel, William B. Steltzfus, Alfredo D'Ascoli, and *Donald R. Roberts* were read for the first time as candidates for membership.

Dr. F. M. Wadley exhibited his new book, "Experimental Statistics in Entomology," published by the Graduate School Press, U. S. Department of Agriculture in 1967. Dr. R. I. Sailer discussed experiences collecting coccinellids along the sea shore at Rehobeth Beach, Delaware. Dr. R. A. St. George reported that an infestation of the Formosan termite had recently been discovered in Eastern South Carolina.

The principal speaker of the evening, Dr. A. B. Park, delighted the audience with a well illustrated discussion of Stress Detection. Any stress exerted on a plant species results in modifications of its normal wavelength signature which can be detected by aereal surveillance. Some of the broad applications of these new techniques were discussed.

Following the introduction of visitors, the meeting was adjourned by President Davis at 9:40 p.m. Respectfully submitted, RALPH A. BRAM, *Recording Secretary.*

755th Regular Meeting—November 2, 1967

The 755th regular meeting of the Society was called to order by President Louis G. Davis on November 2, 1967 at 8:00 p.m. in room 43, U. S. National Museum. Twenty-four members and eleven guests were in attendance. Minutes of the previous meeting were approved as read. *Maynard J. Ramsay, Cary J. Hansel, William B. Steltzfus, Alfredo D'Ascoli,* and *Donald R. Roberts* were received into the Society. The names of *Richard A. Newkirk, F. E. Wood,* and *Suco Nakahara* were read for the first time as candidates for membership.

Mr. R. H. Nelson announced the XIII International Congress of Entomology to be held in Moscow, U. S. S. R from 2–9 August 1968. Dr. William E. Bickley, Chairman of the Nominating Committee, presented the following slate of candidates for 1968: President, Richard H. Foote; President-elect, Helen Sollers-Riedel; Recording Secretary, Ralph A. Bram; Corresponding Secretary, David R. Smith; Treasurer, Arthur K. Burditt, Jr.; Editor, Paul M. Marsh; Custodian, Robert L. Smiley; Program Committee Chairman, Richard G. Oakley; Membership Committee Chairman, William B. Hull.

Dr. R. H. Foote reviewed "The Dictionary of the Biological Sciences" by Peter Gray and published in 1967 by Reinhold Press. Mr. T. L. Bissell reported that in July 1967 a one-acre spot in a 25-acre field of soybeans at Carmichael, Queen Anne's County, Maryland was killed by feeding of adult weevils, *Colomycterus setarius* Roelfs. The spot adjoined a field of maturing wheat from which the insects may have come. This species was first found in Maryland in Baltimore County in 1935. It sometimes appears in large numbers and damages ornamental plants both herbaceous and woody or invades dwellings. This is the first record we have in the State of damage to a field crop. President Davis exhibited the Yearbook of Agriculture for 1967, "Outdoors U. S. A."

The principal speaker for the evening was Mr. Richard Oliver of the National Academy of Science, Division of Biology and Agriculture. During his discussion of the International Biological Program, Mr. Oliver outlined the broad objectives and structure of the Program and encouraged participation by members of the Society.

Following the introduction of visitors, the meeting was adjourned by President Davis at 9:35. Respectfully submitted, RALPH A. BRAM, *Recording Secretary.*

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

Information for Contributors

Publication (without charge) in the Proceedings is reserved for members only. However, immediate publication of papers by members (as well as non-members) may be obtained after acceptance at a cost to the author of $15.00 per printed page. Regular papers are published in approximately the order that they are received. Manuscripts should not exceed 30 typewritten pages including illustrations. Papers of less than a printed page may be published as space is available at the end of longer articles.

Manuscripts for publication, proof and other editorial matters should be addressed to the *Editor* (for address, see inside front cover of this issue).

Typing—All manuscripts must be typed on bond paper with double-spacing and ample margins. Carbon copies or copies on paper larger than 8½ × 11 inches are not acceptable. Do not use all capitals for any purpose. Underscore only where italics are intended in the body of the text, not in headings. Number all pages consecutively. References to footnotes in the text should be numbered consecutively and typed on a separate sheet.

First page—The page preceding the text of the manuscript should include (1) the complete title, (2) the order and family in parentheses, (3) the author's name or names, (4) the institution with city, state and zip code or the author's home city, state and zip code if not affiliated, (5) in the upper left hand corner, the complete name and address to which proof is to be sent.

Names and descriptions of organisms—The first mention of a plant or animal should include the full scientific name with the author of a zoological name *not* abbreviated. Descriptions of taxa should be in telegraphic style.

References—Citations in the text of papers longer than one printed page should be by author and date and should refer to a list of concluding REFERENCES listed alphabetically in the following format:

> Muesebeck, C. F. W. 1963. Host relationships of the Euphorini (Hymenoptera: Braconidae). Proc. Ent. Soc. Wash. 65(4): 306.
>
> ———— and L. M. Walkley. 1951. *in* Muesebeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. Dept. Agr., Agr. Monogr. 2: 90–184.

In shorter articles, references to literature should be included in parentheses in the text.

Tables—Tables are expensive and should be kept to an absolute minimum. In most cases, material in tables can be incorporated into the text. When tables are necessary, each table should be prepared as a line drawing or typed on a separate page with heading at top and footnotes below. Number footnotes consecutively for each table. Use only horizontal rules.

Illustrations—No extra charge is made for line drawings or halftones. Authors must plan their illustrations for reduction to the dimensions of the printed page and the individual figures *must* be mounted on suitable board. Proportions of full-page illustrations should closely approximate 4⅝ × 6″ (26 × 36 picas); this usually allows explanatory matter to appear on the same page. On the back of each illustration should be stated (1) the title of the paper, (2) the author's complete name and address, and (3) the number of the illustration such as "No. 1 (of 3)" etc. Figures should be numbered consecutively.

Figure legends—Legends should be typewritten double-spaced on separate pages headed EXPLANATION OF FIGURES and placed following REFERENCES. Do not attach legends to illustrations.

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PROCEEDINGS

of the

ENTOMOLOGICAL SOCIETY of WASHINGTON

U.S. NATIONAL MUSEUM
WASHINGTON, D.C. 20560

PUBLISHED QUARTERLY

CONTENTS

(Continued on back cover)

THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

ORGANIZED MARCH 12, 1884

OFFICERS FOR 1968

MEETINGS.—Regular meetings of the Society are held in Room 43 of the U.S. National Museum on the first Thursday of each month from October to June, inclusive, at 8 P.M. Minutes of meetings are published regularly in the *Proceedings*.

MEMBERSHIP.—Members shall be persons who have demonstrated interest in the science of entomology. Annual dues for members are $5.00; initiation fee is $1.00 (U.S. currency).

PROCEEDINGS.—Published quarterly beginning with March by the Society at Washington, D.C. Members in good standing are entitled to the *Proceedings* free of charge. Nonmember subscriptions are $8.00 per year, both domestic and foreign (U.S. currency), payable in advance. All remittances should be made payable to *The Entomological Society of Washington*.

The Society does not exchange its publications for those of other societies.

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PROCEEDINGS OF THE

ENTOMOLOGICAL SOCIETY OF WASHINGTON

Vol. 70 JUNE 1968 No. 2

STUDIES ON IDIOCERINAE LEAFHOPPERS: IV. A NEW SPECIES OF BALOCHA AND ONE OF PEDIOSCOPUS, MIMICS

J. MALDONADO-CAPRILES, *Department of Biology, University of Puerto Rico, Cayey Regional College, Cayey, Puerto Rico 00633*

A new species of *Balocha* Baker and one of *Pedioscopus* Kirkaldy are herein described. The generic position of the latter is somewhat tentative; male specimens are needed for a definite decision. Both species were collected by C. F. Baker in Borneo. Unfortunately there is no date or other information on the labels, except Sandakan, that would indicate that they were collected at the same time and place. The coloration of both species is quite similar to that of those species of *Balocha* that are striped with orange and yellow. This meager information suggests that the new species of *Pedioscopus* is a mimic of the new species of *Balocha*.

The types are deposited in the United States National Museum and paratypes in my collection. In the measurements that follow, 10 micrometer units are equivalent to 0.05 mm.

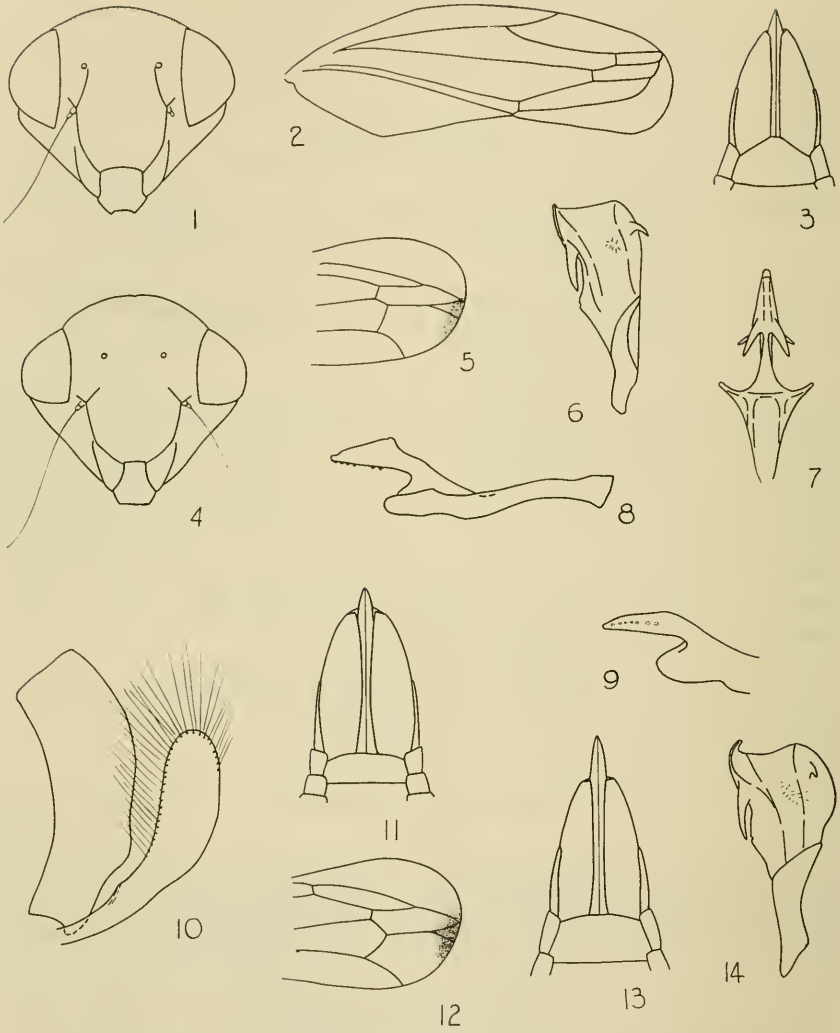
Pedioscopus balochoides, n. sp.
(Figs. 1–3)

Female—general coloration orange and yellow. Head yellowish with an orange transverse band on disk of vertex. Pronotum on anterior half yellowish, posterior half orange. Scutellum bright yellow. Thorax ventrally and laterally, legs, abdomen, and genital sclerites, except for brown tip of ovipositor, yellowish. Clavus orange on inner half, yellowish on outer half. Corium with a pale orange tinge, changing into brownish on apical cells; costal margin pale orange; veins on corium concolorous, barely visible, slightly brownish and better defined near apex of wing. Ocelli black.

Vertex parallel-sided, shagreen, less than ⅓ as long as pronotum (4:10); pronotum about ⅓ as long as wide (10 : 28). Scutellum wider than long (21 : 15). Face as in fig. 1. Forewing as in fig. 2. Length 4.1 mm.

Female genitalia—hind margin of last abdominal sternum angularly produced caudad and with truncate apex (fig. 3). Ovipositor slightly surpassing pygofers, without spines; pygofers smooth.

Holotype, female, USNM 69531; paratypes, one female each in the USNM and in my collection; all from Sandakan, Borneo, C. F. Baker collector.



Figs. 1–3, *Pedioscopus balochoides*, n. sp.: 1, head, frontal view; 2, forewing; 3, last abdominal segments, ♀. Figs. 4–11, *Balocha bicolor*, n. sp.: 4, head, frontal view; 5, apex of forewing; 6, aedeagus, lateral view; 7, aedeagus, caudal view; 8, style, lateral view; 9, apex of style, dorsal view; 10, pygofer and valve, lateral view; 11, last abdominal segments, ♀. Figs. 12–14, *B. bicolor uniformis*, n. ssp.: 12, apex of forewing; 13, last abdominal segments, ♀; 14, aedeagus, lateral view.

The venation of the forewing and the characters of the face indicate that this species is a *Pedioscopus*. It is the only known species of this genus that is banded with orange and yellow. Most of the species in this genus are conspicuously banded or spotted with black.

Others not so marked, like *P. modestus* Baker and *P. maquilingensis* Baker from the Philippine Islands, are ochraceous and definitely not banded with orange.

Balocha bicolor, n. sp.

(Figs. 4–11)

Male—overall color orange and yellow. Vertex yellowish, the band on face barely visible from above; face pale orange, with an orange band from eye to eye above ocelli. Pronotum under margin of head yellow, anterior half orange, posterior half yellowish-orange or yellowish. Clavus with inner longitudinal half orange, outer half whitish-yellow. Corium contiguous to clavus orange, remainder translucent and more or less tinged with pale orange and turning into brownish on apical cells; costal margin narrowly pale orange; veins somewhat conspicuous, slightly deeper orange. Thorax ventrally and laterally, abdomen, legs, and genital capsule pale orange or slightly yellowish. Brown spot on forked cell extending to contiguous outer apical cell.

Vertex very finely striate, about ⅓ as long as pronotum (3.2 : 10); pronotum ⅔ as long as wide (10 : 25), posterior margin very slightly concave above scutellum. Scutellum wider than long (17 : 12). Face (fig. 4) slightly wider across eyes than long (27 : 25); lateral margin of frons (or postclypeus) roundly angled, lateral frontal suture not reaching ocellus, pointed well above ocellus of other side; clypeus (or anteclypeus) expanded apically, bell-shaped, as long as wide apically (5 : 5). Forked cell with peduncle shorter than cell (4 : 7) or slightly longer (7 : 6), as in fig. 5. Length 4.1 mm.

Genitalia typical of the genus, as in fig. 6–10.

Female—coloration and shape much as in male; forked cell of forewing with peduncle slightly shorter (5 : 6) or longer (6 : 5) than cell; blackish spot as in male. Genitalia: last abdominal sternum rectangular, hind margin slightly convex, as in fig. 11.

Holotype, male, USNM 69532; allotype female, in the USNM; six paratypes in the USNM, two in my collection; all from Sandakan, Borneo, C. F. Baker collector.

This species is quite close to *Balocha lucida* Maldonado described from Sarawak. They can be separated, besides the characters in the short key below, by many small details of the aedeagi, different apex of the styles, not so bright orange in *bicolor*, etc. In my key to the studied species of the genus (1961), *B. bicolor* runs to the second part of couplet 3 and can be separated from *B. lucida* as follows:

Peduncle three times as long as pedunculate cell; apical half of aedeagus thicker, with posterior spines arising from apex; ovipositor shiny brown ..... **B. lucida**

Peduncle shorter, about as long as pedunculate cell; apical half of aedeagus thinner, with posterior spines arising below apex; ovipositor dull yellow ..... **B. bicolor**

Balocha bicolor uniformis, n. ssp.

(Figs. 12–14)

Six specimens, from the same locality and perhaps collected at the same time, show slight differences in coloration of the pronotum, shape of the pedunculate cell, and genitalic characters. Although these characters seem to be constant there is intergrading between the extremes of this form and some specimens of the typical form, so I am calling these a separate subspecies. Field or laboratory observations would clarify the real rank of this group.

General shape and coloration much as in the typical form; with the following differences: pronotum uniformly (hence the name) orange, instead of banded; pedicel of pedunculate cell equal in length to cell in most cases, slightly shorter or longer in some (fig. 12), spot of brown near apex of wing extending slightly both sides of pedunculate cell in most specimens. Female genitalia slightly different, as in fig. 13, last sternum rectangular, posterior margin slightly convex. Aedeagus of male more enlarged on apical half (fig. 14).

Holotype, male, 69533. Allotype, female, in the USNM; three paratypes in the USNM, two in my collection. All from Sandakan, Borneo, C. F. Baker collector.

The two forms of *Balocha bicolor* can be separated as follows:

Pronotum with anterior half orange, posterior yellowish ..... **B. bicolor bicolor**
Pronotum uniformly orange ..... **B. bicolor uniformis**

So far I have included seven species in *Balocha*, namely, *B. astuta* (Melichar), *B. bicolor* n. sp., *B. lucida* Maldonado, *B. melichari* (Baker), *B. nacreatus* (Baker), *B. pallida* Maldonado, and *B. tricolor* Distant. *Idiocerinus baker* Merino is either a *Balocha* or a *Pedioscopus* as Merino (1936, p. 326, 327) writes about "the reduction in size of the second apical cell" and "second outer reduced" in this species. The coloration would be unusual for a *Balocha*, and it agrees more with the coloration of other species of *Pedioscopus*. Dr. T. Ishihara, from Ehime University, Matsuyama, Japan, has kindly pointed out to me that "*Balocha flavocapitata* Kato is not an *Idiocerus* but a species closely related to *Oncopsis mali* (Matsumura)." The generic position of *Idiocerinus stali* Fieber and *Balocha angulifera* Walker remain to be established.

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Maldonado-Capriles, J. 1961. Studies on Idiocerinae Leafhoppers: I. *Idiocerinus* Baker, 1915, synonym of *Balocha* Distant, 1908 and notes on the species of *Balocha*. Proc. Ent. Soc. Wash. 63(4): 300–308.

————. 1964. Studies on Idiocerinae Leafhoppers: II. The Indian and Philippine species of *Idiocerus* and the genus *Idioscopus*. Proc. Ent. Soc. Wash. 66(2):89–100.

Merino, G. 1936. Philippine Cicadellidae (Homoptera). Philippine Jour. Sci. 61(3):307–400.

THE NEARCTIC DORYCTINAE, VI. THE GENERA ACROPHASMUS, GLYPTOCOLASTES, DORYCTINUS, AND A NEW GENUS, STENOCORSE (HYMENOPTERA: BRACONIDAE)

PAUL M. MARSH, *Systematic Entomology Laboratory, Entomology Research Division, Agr. Res. Ser., USDA*[1]

The present paper deals with four genera of the Doryctinae in which the head is narrow behind the eyes and somewhat transverse. This shape of the head differs from that of the typical Doryctinae, as exemplified by *Doryctes*, and has influenced past workers to place these genera in several other supergeneric groups (see discussion in Marsh 1965). The species described below in *Acrophasmus* represent the first records of this genus for the Nearctic Region.

Acrophasmus Enderlein

Acrophasmus Enderlein, 1912, p. 16. Type-species: *A. exilis* Enderlein. Monotypic and original designation.

Head transverse or subcubical, temples narrow; first flagellar segment longer than second; forewing (fig. 1) with 3 cubital cells; recurrent vein entering apex of first cubital cell; first brachial cell closed at apex; subdiscoideus leaving first brachial cell below middle of apical end; first segment of mediella short, one-fourth or one-fifth as long as second segment; hindwing of male with a stigma; foretibiae with a row of 5–12 stout spines on anterior edge; tergum (2 + 3) (fig. 4) with a transverse arcuate furrow behind middle and often with a second transverse furrow behind this curved in opposite direction; digitus of male genitalia usually with a tooth on inner side (fig. 6).

The sculpturing of tergum (2 + 3), with its transverse grooves rather than oblique basal grooves, and the short first segment of the mediella in the hindwing will distinguish *Acrophasmus* from the other genera in this group.

This genus has been previously recorded only from the Neotropical Region. One described species, *secundus* (Muesebeck and Walkley), and several new species described below were placed in the genus *Doryctinus* in the collection of the U. S. National Museum but are congeneric with *Acrophasmus*.

KEY TO NEARCTIC SPECIES OF **Acrophasmus**

1. Length of first abdominal tergum usually equal to apical width, at most slightly longer, but then abdominal terga beyond (2 + 3) smooth; female antenna 26-segmented or less 2
   Length of first abdominal tergum at least 1.5 times longer than apical width; abdominal terga beyond (2 + 3) sculptured; female antenna 27-segmented or more 3

[1] Mail address: c/o U. S. National Museum, Washington, D. C. 20560.

2. Radial vein ending on wing margin well before apex, radial cell short along wing margin; abdominal terga beyond (2 + 3) punctate; first abdominal tergum as long as apical width; ovipositor of female slightly shorter than body length ..... **butleri** Marsh, n. sp.
   Radial vein reaching apex of wing, radial cell longer; abdominal terga smooth beyond (2 + 3); first abdominal tergum slightly longer than apical width; ovipositor of female equal to body length ..... **lycti** Marsh, n. sp.
3. Ovipositor of female at least 1.5 times longer than body; vertex rugoso-punctate ..... **secundus** (Muesebeck and Walkley)
   Ovipositor at most 1.25 times longer than body, usually about equal to body length; vertex striate 4
4. Vertex narrow, sharply declivous posteriorly; malar space about one-fourth eye height, temples one-third eye width; body color reddish brown or lighter ..... **ferrugineus** Marsh, n. sp.
   Vertex rounded, not sharply declivous posteriorly; malar space about one-third eye height, temples at least one-half eye width; body color brown or dark brown ..... **arizonensis** Marsh, n. sp.

Acrophasmus arizonensis Marsh, n. sp.
(Figs. 8, 9)

Female.—Body length, 5–5.5 mm; ovipositor, 6–7 mm. Color brown to dark brown, head and mesonotum usually darker, legs beyond femora and antennae light brown. Head subcubical, vertex rounded, not declivous behind; temples one-half eye width; malar space one-third eye height; frons not excavated; head entirely finely striate except temples which are usually smooth below; antenna 30-segmented. Propleuron rugose along posterior margin, punctate above propleural groove; anterior mesonotal angles rounded; mesonotal lobes punctate; notauli foveolate, obscured behind by wide rugose area covering posterior one-half of median mesonotal lobe; scutellar furrow with 6 cross carinae; scutellar disc punctate, margined laterally; mesopleural disc and mesosternum punctate; mesopleural furrow shallow, narrow, weakly foveolate; subalar groove wide, rugose; basolateral areas of propodeum indicated by indistinct carinae, punctate basally; remainder of propodeum rugose. Foretibia with row of 7–8 spines; fore and midlegs nearly smooth, hindlegs finely punctate. Wing venation as in fig. 8; radiella absent or very indistinct. First abdominal tergum 1.5 times longer than apical width, longitudinally rugose, median area indicated basally by 2 indistinct carinae and apically by a raised short area, obscured medially; tergum (2 + 3) 1.25 times longer than wide, longitudinally rugose except apex which is smooth, both transverse grooves distinct; remainder of abdominal terga punctate on basal one-half, smooth on apical one-half; ovipositor a little longer than body.

Male.—Essentially as in female; antenna 27-segmented; hindwing with a stigma (fig. 9).

Holotype Female.—ARIZONA: Bear Canyon, Hk. Hwy. mi. 12, Santa Catalina Mountains, July 14, 1961, Werner, Nutting, U.V. lt. trap. USNM 69637.

Paratypes.—1♀, 1♂, same data as type. Female paratype deposited in collection of Univ. of Arizona, Tucson; male in U. S. Nat. Mus.

Acrophasmus butleri Marsh, n. sp.
(Figs. 10, 11)

Female.—Body length, 4 mm; ovipositor, 3 mm. Color dark brown except head and forelegs which are lighter brown. Head somewhat transverse; vertex rounded, not declivous behind; malar space one-third eye height; temples about three-fifths eye width; frons and vertex striate, temples weakly striate dorsally, smooth ventrally, face indistinctly rugose; antenna 23-segmented. Propleuron rugosopunctate; propleural groove indistinct; anterior angles of mesonotum prominent, rounded; mesonotal lobes rugosopunctate; notauli indistinct, obscured behind by wide rugose area covering posterior one-half of median mesonotal lobe; scutellar furrow with 7 cross carinae; scutellar disc punctate, margined laterally; mesopleural disc rugosopunctate; mesopleural furrow deep, narrow, weakly foveolate; mesosternum punctate; propodeum entirely rugosopunctate. Foretibia with row of 5–6 spines (forelegs missing in female holotype). Wing venation as in fig. 10; radial cell short, radial vein reaching wing margin well before apex. First abdominal tergum as long as apical width, longitudinally rugosopunctate, raised median area distinct only at apex; tergum (2 + 3) as long as greatest width, longitudinally rugosopunctate before first transverse groove, rugae disappearing behind so that apical one-fourth of tergum is punctate, first transverse groove very indistinct, second absent; remainder of terga punctate entirely; ovipositor slightly less than body length.

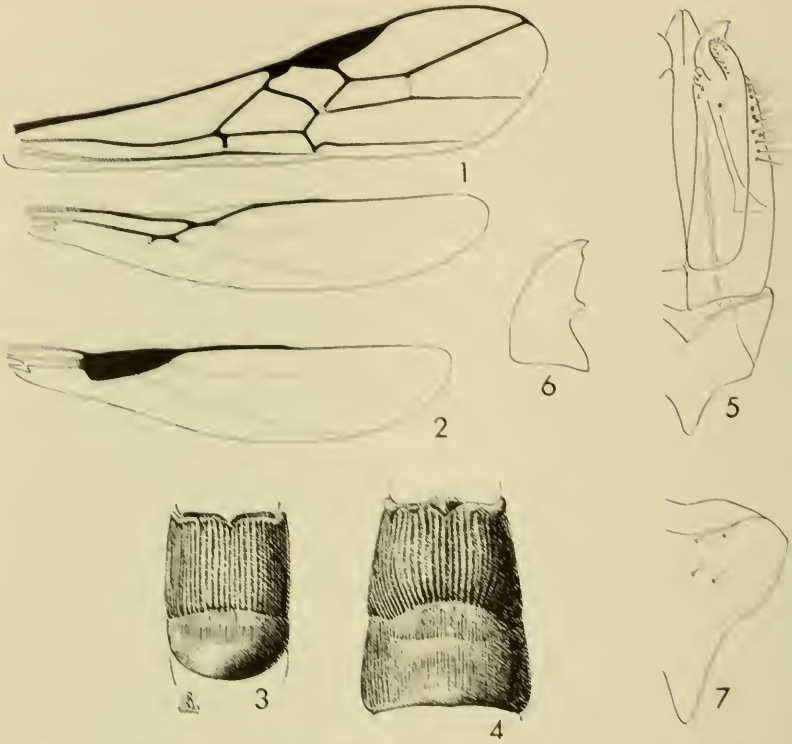
Male.—Essentially as in female; antenna 22–23 segmented; hindwing with a stigma (fig. 11).

Holotype Female.—ARIZONA: Santa Rita Range Reserve, Pima County, June 2, 1958, G. D. Butler, swept/mesquite. USNM 69638.

Paratypes.—2 ♂ ♂, same data as type except one dated May 4, 1957. One ♂ paratype deposited in collection of Univ. of Arizona, Tucson; other in U. S. Nat. Mus.

Acrophasmus ferrugineus Marsh, n. sp.
(Figs. 1, 2, 4–7)

Female.—Body length, 4.5–7 mm; ovipositor, 4–6.5 mm. Color brownish red to reddish orange; head, legs, and venter of abdomen always reddish orange. Head slightly transverse; vertex sharply declivous behind; frons slightly depressed; eyes large; malar space about one-fourth eye height; temples about one-third eye width; vertex and temples striate, frons and face rugosopunctate; antenna 30–40 segmented. Pronotum short; propleuron rugose; propleural groove broad, foveolate; mesonotum sharply declivous anteriorly, anterior angles rounded; mesonotal lobes punctate; notauli foveolate anteriorly, obscured posteriorly by wide rugose area which covers posterior three-fourths of middle mesonotal lobe; scutellar furrow with 6 cross carinae; scutellar disc flat, punctate; mesopleuron rugosopunctate; mesopleural furrow narrow, weakly foveolate; mesosternum punctate; propodeum entirely rugose, rarely with some indication of a pattern of carinae. Foretibia with an irregular row of 8–12 stout spines; legs mostly punctate. Wing venation as in fig. 1. First abdominal tergum 1.75 times longer than apical width, longitudinally rugose with an indistinct raised median area which narrows apically; tergum (2 + 3) slightly longer than its greatest width, longi-



Figs. 1, 2, 4–7. *Acrophasmus ferrugineus*, n. sp.: 1, fore and hindwings, ♀; 2, hindwing, ♂; 4, abdominal tergum (2+3), dorsal view; 5, ♂ genitalia; 6, digitus; 7, ninth sternum, ♂. Fig 3, *A. secundus* (Mues. & Walk.), abdominal tergum (2+3), dorsal view.

tudinally rugose before first transverse groove, longitudinally rugosopunctate behind; second transverse groove present, usually weak; remainder of abdominal terga punctate; ovipositor nearly as long as body.

Male.—Essentially as in female; length, 2.4–3.5 mm; antenna 21–32 segmented; head not always as sharply declivous behind; hindwing with a stigma (fig. 2); genitalia as in figs. 5–7.

Holotype Female.—NORTH CAROLINA: Durham, June 30, 1943, J. A. Beal colr., Host: *Celtis laevigata* Weed. USNM 69639.

Paratypes.—GEORGIA: Atlanta, 1 ♀, June 23, 1938, P. W. Fattig. FLORIDA: Mariana, 4 ♀♀, June 19, 1905, W. F. Fiske. MISSOURI: Jefferson City, 1 ♀, April 22, 1958, A. C. Burrill, ex. *Diospyros virginiana* L. MISSISSIPPI: Doko (?), 1 ♀, 1 ♂, April 14, 1920, M. W. Blackman. NORTH CAROLINA: Durham, 5 ♀♀, June–August, 1943, *C. laevigata*, *Quercus borealis* var. *maxima* (Marsh.) Ashe; Raleigh, 1 ♂, August 16, 1940, R. C. Barnes. PENNSYLVANIA: Linglestown,

4 ♀♀, 1 ♂, A. B. Champlain, Hopk. U. S. 12214. SOUTH CAROLINA: Ferguson, 1 ♀, 5 ♂♂, ex *Lyctus planicollis* LeConte in *Fraxinus*; Charleston, 1 ♀, June 1, 1905, W. F. Fiske. TEXAS: Brownsville, 6 ♀♀, 4 ♂♂, H. S. Barber; Cameron County, 1 ♂, August 3, 1928, R. H. Beamer; Victoria, 1 ♀, June 11, 1907, R. A. Cushman; Winona, 2 ♀♀, 3 ♂♂, October, 1930, H. Baker, dead pecan wood. VIRGINIA: Falls Church, 1 ♂, June, 1922, R. A. St. George. All paratypes deposited in U. S. Nat. Mus.

In addition to the type series I have seen specimens of *ferrugineus* from Brazil, Guatemala, and the British West Indies.

Host.—Several specimens were reared from *Lyctus planicollis* LeConte in *Fraxinus*, and from unknown hosts in *Celtis laevigata*, *Quercus borealis* var. *maxima*, and *Diospyros virginiana*.

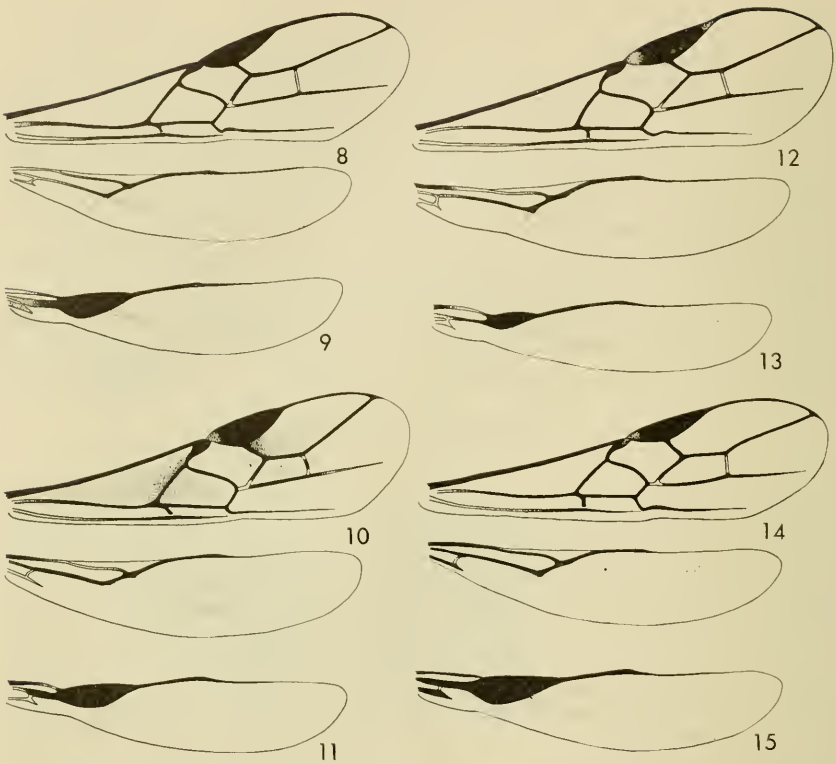
Acrophasmus lycti Marsh, n. sp.
(Figs. 12, 13)

Female.—Body length, 2.5–4 mm; ovipositor, 2.5–4 mm. Color reddish brown except legs and sometimes apex of abdomen and venter of thorax which are honey yellow. Head subcubical; vertex rounded; eyes large; malar space nearly one-fourth eye height; temples one-third eye width; frons, vertex, and temples finely striate, temples often smooth on lower portion, face rugulose; antenna 18–26 segmented. Propleuron punctate; propleural groove broadening posteriorly, foveolate; mesonotal lobes punctate; notauli foveolate, obscured behind by wide rugose area which covers apical one-half to three-fourths of median mesonotal lobe; anterior mesonotal angles not prominent, rounded; scutellar furrow with 6 cross carinae; scutellar disc punctate; mesopleural disc and mesosternum punctate; mesopleural furrow narrow, foveolate; subalar groove rugose; propodeum mostly rugose, carinae weakly indicated but forming large areola medially, basolateral areas punctate. Foretibia with row of 5–7 spines. Wings as in fig. 12. First abdominal tergum one and one-third times longer than apical width, longitudinally rugose, raised median area distinct basally and apically, obscured medially; tergum (2 + 3) as long as widest part, longitudinally rugose, smooth at apex, first transverse groove distinct, sinuate, second groove indistinct; remainder of terga usually smooth and highly polished, at most very finely granular basally; ovipositor equal to length of body.

Male.—Essentially as in female; length, 2–3 mm; antenna 17–23 segmented; hindwing with a stigma (fig. 13).

Holotype Female.—FLORIDA: Indian River County, June 10, 1957. USNM 69640.

Paratypes.—FLORIDA: Crescent City, 11 ♀♀, 8 ♂♂, reared from bamboo infested with *Lyctus striatus* Melsheimer; Indian River County, 8 ♀♀, 1 ♂, June 10, 1957; Lake City, 1 ♀, 1 ♂, H. G. Hubbard, ex *Lyctus* in bamboo. LOUISIANA: Tallula, 8 ♀♀, 15 ♂♂, October 5, 1939, M. B. Christian, ex *Lyctus* infested Pecan. NORTH CAROLINA: Watauga County, 3 ♀♀, ex-hickory rake handle infested with powder post beetles. SOUTH CAROLINA: Ferguson, 3 ♀♀,



Figs. 8–15, wings of *Acrophasmus* species: 8, *arizonensis*, n. sp., ♀ fore and hindwing; 9, same, ♂ hindwing; 10, *butleri*, n. sp., ♀ fore and hindwing; 11, same, ♂ hindwing; 12, *lycti*, n. sp., ♀ fore and hindwing; 13, same, ♂ hindwing; 14, *secundus* (Mues. & Walk.), ♀ fore and hindwing; 15, same, ♂ hindwing.

12 ♂♂, W. F. Fiske, Hopk. U. S. 3486E. All paratypes deposited in U. S. Nat. Mus.

Hosts.—*Lyctus* sp. and *L. striatus* in bamboo.

Acrophasmus secundus (Muesebeck and Walkley), n. comb.
(Figs. 14, 15)

Heterospilus texanus Ashmead, 1896, p. 214. Holotype male in U. S. Nat. Mus., no. 58860, preocc. in *Doryctinus* by Ashmead, 1889.

Doryctinus secundus Muesebeck and Walkley, 1951, p. 178. New name for *texanus* Ashmead, 1896.

Female.—Body length, 3.5–6 mm; ovipositor, 5–10 mm. Color dark brown, tarsi and antennae brown, tibiae with white annulus at base. Head nearly cubical; vertex rounded, not sharply declivous behind; temples two-thirds eye width; malar space about one-third eye height; vertex, frons, and face

rugosopunctate, frons sometimes appearing striate in smaller specimens, temples transversely striate, often smooth on lower portion; antenna 27–34 segmented. Propleuron rugose; propleural groove very broad; mesonotal lobes rugosopunctate, anterior mesonotal angles prominent but rounded, median mesonotal lobe slightly depressed anteriorly between angles; notauli foveolate anteriorly, obscured posteriorly by wide rugose area which covers posterior three-fourths of middle mesonotal lobe; scutellar furrow with 6 cross carinae; scutellar disc punctate, margined laterally; mesopleuron rugose; mesopleural furrow broad, foveolate; mesosternum striatopunctate; propodeum entirely rugose with lateral carinae and areola occasionally weakly indicated. Legs granular; foretibia with row of 8–10 stout spines. Wing venation as in fig. 14. First abdominal tergum 1.5 times longer than apical width, longitudinally rugose, often with an indistinct raised median area; tergum (2 + 3) 1.25 times longer than greatest width, longitudinally rugose except apex which is smooth; first transverse groove very distinct, second usually absent, occasionally indicated by a weak indentation; remainder of terga granular on basal three-fourths, smooth on apical one-fourth; ovipositor at least 1.5 times longer than body.

Male.—Essentially as in female; hindwing with a stigma (fig. 15).

Type Locality.—Cypress Mills, Texas.

Distribution.—Georgia, Louisiana, Massachusetts, Michigan, Missouri, New Jersey, Ohio, Pennsylvania, Rhode Island, Texas, Virginia; Mexico (Cuernavaca).

Glyptocolastes Ashmead

Glyptocolastes Ashmead, 1900, p. 142. Type-species: *Glyptocolastes texanus* Ashmead. Monotypic and original designation.

Glyptodoryctes Ashmead, 1900, p. 144. Type-species: *Heterospilus caryae* Ashmead. Monotypic and original designation. **New synonymy.**

Head somewhat transverse, narrow behind the eyes; first flagellar segment longer than second; thorax stout; forewing with 3 cubital cells; second segment of radius often shorter than first intercubitus; recurrent vein entering apex of first cubital cell; subdiscoideus leaving first brachial cell below its middle; first segment of mediella at least equal to second segment, usually longer; foretibia with row of 6–10 stout spines; abdominal tergum (2 + 3) with oblique diverging grooves which set off basal corners of tergum (fig. 24), rarely these grooves are connected medially by a fine transverse line.

Ashmead (1900) characterized *Glyptocolastes* and *Glyptodoryctes* only as he included them in his key to the Ichneumonoidea. Similarities in wing venation, sculpture of tergum (2 + 3), and general habitus leaves no doubt that the type-species of these genera are congeneric. In 1909, Crawford described the species *bruchivorus* and placed it in *Glyptocolastes.* However, because of differences in male genitalia, wing venation, and habitus, I feel that this species is not congeneric with *texanus* and *caryae* and is quite distinct from all

genera of the Doryctinae, a fact which warrants a separate generic placement for it (see below).

KEY TO SPECIES OF **Glyptocolastes**

1. Females 2
   Males 3
2. First abdominal tergum shorter than apical width, at most equal; second segment of radius shorter than first intercubitus ..... **texanus** Ashmead
   First abdominal tergum longer than apical width; second segment of radius usually equal to or longer than first intercubitus ..... **caryae** (Ashmead)
3. Hindwing with a stigma ..... **caryae** (Ashmead)
   Hindwing without a stigma ..... **texanus** (Ashmead)

Glyptocolastes caryae (Ashmead), n. comb.
(Figs. 16, 17, 20, 21, 24)

Heterospilus caryae Ashmead, 1896, p. 214. Holotype female in U. S. Nat. Mus., no. 69559.

Glyptodoryctes caryae (Ashmead), 1900, p. 144.

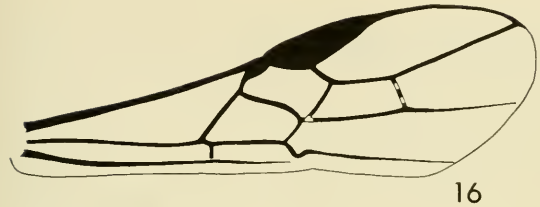
Hormiopterus claripennis Brues, 1907, p. 61. Holotype female in Milwaukee, Wisconsin, Public Museum.

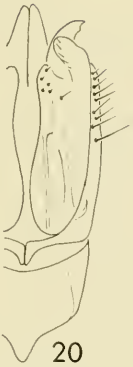
Female.—Body length, 2.5–6 mm; ovipositor, 2–6 mm. Color light to dark brown, legs usually brown or honey yellow. Head transverse, temples about two-fifths eye width, somewhat wider in smaller specimens; malar space about one-fourth eye height; face roughened except for raised smooth line down middle; temples usually smooth; frons and vertex transversely striate; vertex in larger specimens declivous behind; antenna 23–37 segmented. Pronotum very short; propleuron rugose; propleural groove deep, foveolate; mesonotum strongly declivous anteriorly, dorsal surface at right angles with anterior surface; mesonotal lobes punctate; notauli deep, foveolate, obscured behind by wide rugose area which is about as wide as scutellar disc; scutellar furrow with 7 cross carinae; scutellar disc punctate; mesopleural disc punctate; mesopleural furrow deep, foveolate; subalar groove wide, rugose; mesosternum punctate; propodeum strongly rugose, carinae usually not distinct but rugae occasionally forming areola medially. Hindcoxae punctate laterally, rugose dorsally; femora punctate. Wing venation as in fig. 16; second segment of radius usually longer than first intercubitus; first segment of mediella longer than second, usually much longer. First abdominal tergum about 1.5 times as long as apical width, strongly longitudinally rugose, with a weakly defined raised median area; tergum (2 + 3) slightly longer than wide, oblique grooves deep and occasionally connected across tergum by a semicircular fine line or groove (fig. 24); tergum (2 + 3) longitudinally rugosopunctate on nearly its entire length, smooth only at extreme apex; remainder of terga granular at least basally; ovipositor nearly as long as body.

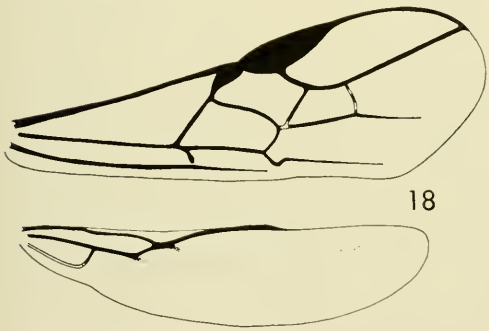
Male.—Essentially as in female; length, 2.5–4 mm; antenna 21–32 segmented; hindwing with a stigma (fig. 17); genitalia as in figs. 20, 21.

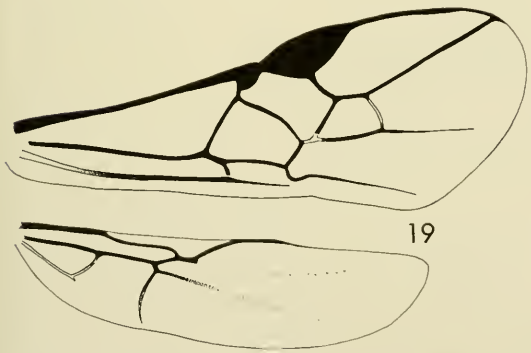
Type Locality.—Morgantown, West Virginia.

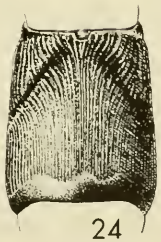
Distribution.—Arkansas, Florida, Georgia, Kansas, Maryland, Missis-











Figs. 16, 17, 20, 21, 24, *Glyptocolastes caryae* (Ashm.): 16, fore and hindwing, ♀; 17, hindwing, ♂; 20, ♂ genitalia; 21, ♂ ninth abdominal sternum; 24, abdominal tergum (2+3), dorsal view. Fig. 18, *G. texanus* Ashm., fore and hindwing, ♀. Figs. 19, 22, 23, *Stenocorse bruchivora* (Cwfd.): 19, fore and hindwings, ♀; 22, ♂ genitalia; 23, ♂ ninth abdominal sternum.

sippi, New York, North Carolina, Pennsylvania, South Carolina, Texas, Virginia, Washington, D. C., West Virginia.

Host.—*Scobicia bidentata* (Horn).

Glyptocolastes texanus Ashmead
(Fig. 18)

Glyptocolastes texanus Ashmead, 1900, p. 142. Holotype female in U. S. Nat. Mus., no. 14167.

Female.—Body length, 2–4 mm; ovipositor, 1–2 mm. Color entirely brown or dark brown except legs, lower part of head, and mouthparts which are often light brown or honey yellow. Head somewhat transverse; temples about one-half eye width; malar space one-third eye height; vertex and frons transversely striate, face roughened, temples smooth at least on lower portion; vertex declivous behind in larger specimens; antenna 19–27 segmented. Pronotum short; propleuron rugosopunctate; propleural groove shallow, indistinctly foveolate; mesonotum strongly declivous anteriorly, anterior and dorsal surfaces at right angle or greater; mesonotal lobes punctate; notauli shallow, foveolate, obscured posteriorly by rugose area which is usually not as wide as scutellar disc; scutellar furrow with 7 cross carinae; scutellar disc punctate, margined laterally; mesopleural disc rugosopunctate; mesopleural furrow shallow, weakly foveolate; subalar groove indistinct; propodeum rugose, basolateral areas often punctate. Hindcoxae punctate, often rugose dorsally; femora punctate. Wing venation as in fig. 18; second segment of radius usually shorter than or equal to first intercubitus; first segment of mediella longer than second. First abdominal tergum usually shorter than apical width, at most equal, longitudinally rugose, with narrow raised median area; tergum (2 + 3) wider apically than long, longitudinally rugosopunctate on basal three-fourths, oblique grooves shallow; remainder of terga punctate basally, smooth apically; ovipositor about as long as abdomen plus one-half of thorax.

Male.—Essentially as in female; hindwing without a stigma.

Type Locality.—San Diego, Texas.

Distribution.—Arizona, Texas; Baja California.

Host.—*Dendrobiella quadrispinosa* (Lec.).

Stenocorse Marsh, n. gen.

Type-species: *Glyptocolastes bruchivorus* Crawford.

Head transverse; temples narrow, equal to one-half eye width or less; thorax robust; notauli weakly or not at all defined; second segment of radius of forewing equal to or shorter than first; radius reaching wing margin before apex of wing; stigma broad; recurrent vein entering base of first cubital cell; subdiscoideus leaving first brachial cell near its base; nervulus postfurcal; radiella of hindwing weak or absent; first segment of mediella longer than second; postnervellus usually curved toward wing apex; hindwing of male without stigma; foretibia with row of 8–12 short spines on outer edge; femora and tibiae somewhat swollen; abdomen short, broadly oval; abdominal tergum (2 + 3) with a bisinuate transverse groove or weak line on basal one-half; ovipositor not longer than abdomen; digitus and cuspis of male genitalia truncate.

As mentioned earlier, *Glyptocolastes bruchivorus* is quite distinct from most Doryctinae and certainly does not belong in that genus which is exemplified by *G. texanus* Ashmead. Therefore, the above new genus is proposed for this species and several, as yet undescribed, Neotropical ones. Of particular importance in distinguishing *Stenocorse* is the transverse head and narrow temples, the robust habitus, the short second segment of the radius, the sculpture of abdominal tergum (2 + 3), and the structure of the male genitalia.

Species in this genus are apparently parasites of seed beetles in the family Bruchidae and are distributed from the southwestern United States to South America and the West Indies. The Nearctic Region contains one species, the type-species of the genus.

Stenocorse bruchivora (Crawford), n. comb.
(Figs. 19, 22, 23)

Glyptocolastes bruchivorus Crawford, 1909, p. 203. Holotype female in the U. S. Nat. Mus., no. 12816.

Female.—Length of body, 3–4.5 mm; ovipositor, 0.75–1.5 mm. Thorax and abdomen reddish-brown, head and legs lighter brown, legs sometimes honey yellow, mesonotum, mesopleuron, and abdominal terga often marked with black, propodeum often entirely black; entire body with a thick covering of gold hair. Head rugose, vertex strongly so; frons slightly excavated; malar space one-third eye height; temples slightly less than one-half eye width; antennae 20–27 segmented. Thorax short and broad, nearly as broad between tegulae as high; pronotum extremely short; propleuron longitudinally rugose; mesonotum sharply declivous anteriorly, coarsely rugose; notauli weak, indicated by coarser rugae, meeting posteriorly in a wide rugose area; scutellar furrow with 5 cross carinae; scutellar disc flat, granular; mesopleural disc rugulopunctate; subalar groove wide, foveolate; mesopleural furrow wide, deep, weakly foveolate, about two-thirds mesopleural width; mesosternum granular, short transverse rugae on either side of median sternal groove; propodeum sharply declivous posteriorly, dorsal surface about as long as scutellar disc, strongly rugose, occasionally with granular basolateral areas and a short basal carina. Wing venation as in fig. 19; second segment of radius never longer than first; nervulus postfurcal by about its own length. Femora and tibiae somewhat swollen, femora about three times as long as wide; tarsi short, hind basitarsus about as long as first flagellar segment; last segment of hindtarsus equal in length to second. Abdomen about as long as thorax, oval, strongly arched; first tergum longitudinally rugose, about one and one-half times wider at apex than long, abruptly declivous basally, with two longitudinal carinae converging toward apex; tergum (2 + 3) two-thirds as long as apical width, longitudinally rugose except for apical one-fourth which is granular; tergum (2 + 3) with a bisinuate transverse groove across basal one-half which is sometimes represented only by a weak line, lateral sections of this groove sometimes extend to base of tergum; remainder of abdominal terga granular; ovipositor at most equal in length to abdomen beyond first tergum.

Male.—Essentially as in female; length of body, 2.5–4.5 mm; genitalia as in figs. 22, 23; digitus and cuspis truncate, ninth sternum broad.

Type Locality.—Victoria, Texas.

Distribution.—Arizona, Texas; Mexico, Canal Zone, Peru; Hawaii.

Hosts.—*Algarobius prosopis* (Lec.), *Acanthoscelides quadridentatis* (Schaffer), *Mimosestes sallaei* (Sharp), *Megacerus* sp.

Doryctinus Roman

Doryctinus Roman, 1910, p. 122. Type-species: *Exothecus rugulosus* Cresson. Monotypic and original designation.

Roman proposed this genus on the basis of assumed topotypic material of *Exothecus rugulosus*. His brief description and illustrations indicate that this material was not conspecific, and probably not congeneric, with *E. rugulosus*. The type of *rugulosus* is, however, unique and apparently intermediate between *Glyptocolastes* and *Acrophasmus*. The first segment of the mediella in the hindwing of *rugulosus* is slightly shorter than in species of *Glyptocolastes*, but longer than in species of *Acrophasmus*. The sculpturing of tergum (2 + 3) combines the oblique basal grooves of *Glyptocolastes* and the transverse furrows of *Acrophasmus*. In general habitus, *E. rugulosus* appears similar to *G. caryae*. Other than the holotype female, I have seen only two females which can be referred to *Doryctinus*. Until I am able to see more material of this group, particularly males, I wish to retain it as a distinct genus. A second species referred to *Doryctinus, secundus* (Muesebeck and Walkley), is now placed in the genus *Acrophasmus* (see before).

Doryctinus rugulosus (Cresson)

Exothecus rugulosus Cresson, 1872, p. 190. Holotype female in U. S. Nat. Mus., no. 1620.

Doryctes texanus Ashmead, 1889, p. 627. Holotype female in U. S. Nat. Mus., no. 2930 (same specimen as *E. rugulosus* Cresson).

Female.—Body length, 6 mm; ovipositor, 5 mm. Head, legs, and abdomen brown, thorax darker brown. Head somewhat transverse; temple slightly less than one-half eye width; malar space about one-third eye height; vertex and frons striate, temples smooth, face rugulose except for smooth median longitudinal raised line; vertex narrow, declivous posteriorly; antenna broken in type, first flagellar segment longer than second. Pronotum short, nearly vertical; propleuron rugose, propleural groove deep, foveolate; mesonotum sharply declivous anteriorly; mesonotal lobes punctate, median one with an indistinct median longitudinal foveolate line on anterior face; notauli foveolate anteriorly; scutellar disc granular; mesopleural disc and mesosternum punctate; mesopleural furrow foveolate; subalar groove wide, rugose; propodeum rugose, without carinae. Legs including coxae punctate. Second segment of radius about as long as first intercubitus; recurrent vein entering extreme apex of first cubital cell; radiellen

cell strongly narrowing toward apex, radiella reaching wing margin before wing apex; first segment of mediella equal to second. First abdominal tergum longer than apical width, longitudinally rugose; tergum (2 + 3) with 2 wide, shallow, longitudinal, diverging grooves on basal one-half and 2 narrow, deep, transverse grooves across middle; remainder of abdominal terga granular; ovipositor nearly as long as body.

Type Locality.—Texas.

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THE SYNONYMY OF AMOEBALERIA SACKENI GARRETT
(Diptera: Heleomyzidae)

A series of 21 specimens, all taken in the same cave (Equality Cave, Saline County, Illinois, 22 May–15 October 1967) by Ronald A. Brandon, of Southern Illinois University, and kindly submitted by him for determination, shows variation between the conditions considered typical of *Amoebaleria defessa* Osten Sacken, 1877, and *A. sackeni* Garrett, 1925 (v. Gill, 1962, Proc. U.S. Nat. Mus. 113: 578–580; Steyskal, 1967, Proc. Ent. Soc. Wash. 69:296). The variation indicates that the form described as *A. sackeni* is no more than that assumed by the larger or more robust specimens of *A. defessa*. *A. sackeni* Garrett should, therefore, be considered a synonym of *A. defessa* Osten Sacken.—George C. Steyskal, *Systematic Entomology Laboratory, Entomology Research Division, Agr. Res. Serv., USDA, c/o U.S. National Museum, Washington, D.C. 20560.*

THE GENUS BRACHYTREMELLA TRÄGÅRDH, 1946, WITH DESCRIPTIONS OF THREE NEW SPECIES (ACARINA: DIARTHROPHALLIDAE)[1]

PRESTON E. HUNTER *and* SANDRA GLOVER,[2] *Department of Entomology, University of Georgia, Athens, Georgia 30601*

Trägårdh (1946) erected *Brachytremella* for a single female, *B. spinosa* Trägårdh, collected from a passalid beetle, *Protomocerus* sp., from New Guinea. Womersley (1961) redescribed the female and described the male and tritonymph from passalids collected in New Guinea. At the same time Womersley described two additional species—*trägårdhi* from Australia and *bornemisszai* from Australia and New South Wales—and gave a key to the three species. In this paper we are describing three new species taken from a small collection of alcohol preserved passalid beetles from Costa Rica and bringing to six the number of species in the genus.

Brachytremella Trägårdh, 1946

Trägårdh, I. 1946. Ent. Medd. 24:386. New genus by designation.
Womersley, H. 1961: Trans. Roy. Soc. S. Aust. 84:11.

Adults of this genus may be recognized by the following characters: body oval in shape and bearing 6 pairs of long, heavy, barbed, capitate dorsal setae; metopodal plates absent or fused with ventral plate; genital plate of the female not separated posteriorly by a suture from the ventral plate; legs II of the male not modified. The protonymph has 5 pairs of dorsal setae of the same type as in the adult, whereas the deutonymph has 6 pairs of setae of this type.

Brachytremella joanae, n. sp.
(Fig. 1A–F)

Known only from the female and deutonymph and may be recognized by the following characters: 2nd and 4th pairs of dorsal setae shorter than other dorsal setae, dorsum of femora III and IV bearing 2 heavy, spined setae; female ventral plate not enlarged behind coxae IV; in the deutonymph only sternal setae IV are on the ventral plate.

FEMALE. Idiosoma 480μ long, 370μ wide. (Measurements are the average of 2 specimens.) Shape rounded oval. *Dorsum* (fig. 1A). Dorsal plate entire, not extending to posterior and posterolateral margins of body; plate with a number of pores located in the general arrangement of the setal pattern of mesostigmata. Six pairs of spined, heavy, tapering setae, all ending in a small but distinct knob; 4 pairs arising from dorsal plate, pairs 5 and 6 arising from integument; anterior (1st) pair 320μ long, 2nd 210μ, 4th pair slightly longer

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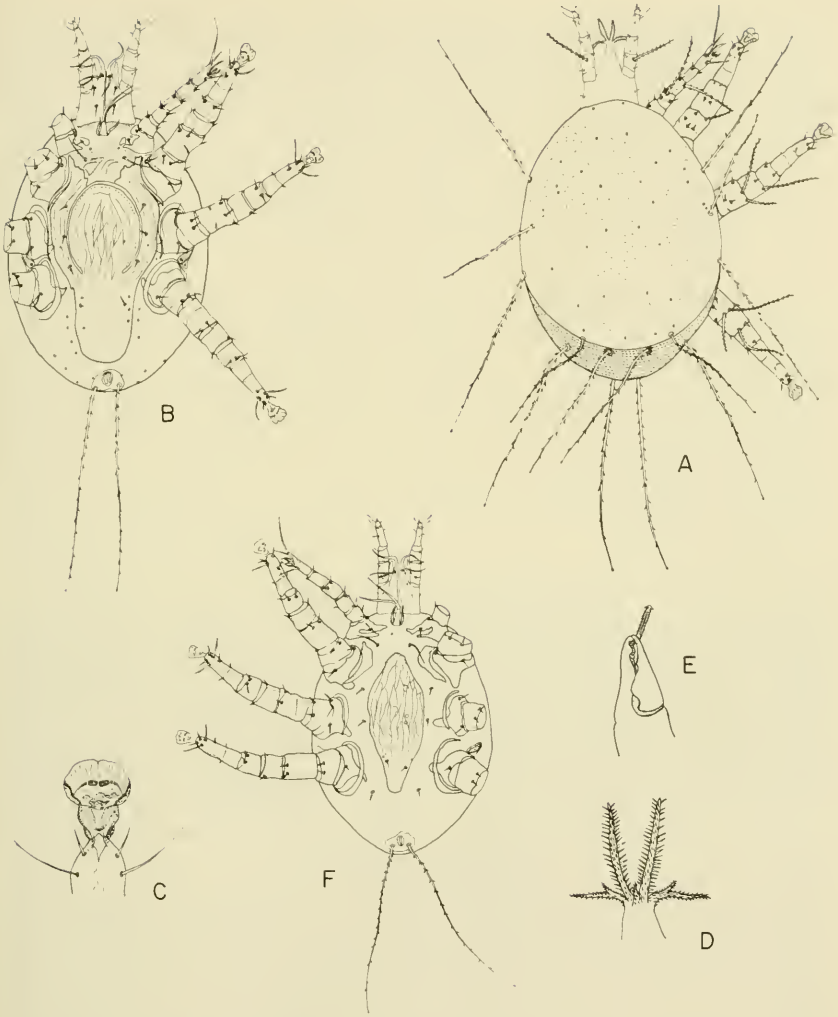

Fig. 1. *Brachytremella joanae*, n. sp. Female: A, dorsum; B. venter; C, caruncle II, ventral view; D, tectum; E. chelicera. Deutonymph: F, venter.

than 2nd; median pair of setae arising from integument 290μ long, lateral pair from integument 365μ long. *Venter* (fig. 1B). Sternal, metasternal and ventral plates coalesced, extending posterior of coxae IV, not widening behind coxae IV; combined plate 400μ long, 215μ between coxae III, 130μ between coxae IV and 115μ near the rounded posterior end of the plate; sternal area only semisclerotized medially, sclerotized at lateral margins; reticulations on sclerotized area of sternal, metasternal and genital plates; ventral area of plate not distinctly reticulated; 5 pairs of ventral setae; sternal setae I arising from

Table 1. Deutonymph-adult leg chaetotaxy formulae of *Brachytremella*. Total number of setae only given for the tarsi. Deviations of *B. crossi* given in footnotes.

Leg	Coxa	Trochanter	Femur	Genu	Tibia	Tarsus
I	$0\frac{0}{2}0$	$1\frac{1}{0}1$	$1\frac{21}{11}1$	$1\frac{11}{00}1$	$1\frac{01}{11}1$	7 setae[c]
II	$0\frac{0}{2}0$	$1\frac{0}{2}1$	$1\frac{22}{11}1$	$1\frac{11}{00}1$	$1\frac{01}{11}1$	13 setae
III	$0\frac{0}{2}0$	$1\frac{1}{2}0$	$1\frac{22}{11}1$[b]	$1\frac{11}{00}1$	$1\frac{01}{11}1$	13 setae
IV	$0\frac{0}{1}0$	$1\frac{2}{2}0$[a]	$1\frac{22}{11}1$[b]	$1\frac{11}{00}1$	$1\frac{01}{11}1$	13 setae

[a] *B. crossi*: $1\frac{1}{2}0$

[b] *B. crossi*: $1\frac{21}{11}1$

[c] *B. crossi*: 6 setae

semisclerotized area of sternum, approximately 3 times length of other ventral setae; 5th pair of setae located at posterior level of coxae IV; positions of other setae and relative length of setae as shown; pores in plate and integument as shown. Genital plate elongate-rounded, 178μ long, 143μ wide, fused posteriorly to ventral plate; thickened along free margins. Endopodal plates II fused to sternal plate anteriorly, free along posterior half; III free, curving around anterior of coxa III; IV encircling coxa IV, widening slightly posterior of coxa. Anal plate wider than long, bearing 2 spined, tapering, apically knobbed setae up to 395μ long. Peritremal plate surrounding peritreme, enlarging lateral of stigmata and bearing a pore; peritreme length 3–4 times width of stigmata. Metopodal plates absent. Tritosternum of type illustrated in fig. 2D; one pair of fleshy, ciliated setae flanking base. *Legs*. Coxa I fragmented, medial setae arising from integument. Chaetotaxy, following Evans (1963), given in table 1. All setae simple except the subterminal clawlike structure on tarsus I and spined, heavy setae on the following: 1 seta on genua I, III and IV; 1 on femora I and II; 2 on femora III and IV, the posterior seta on each segment shortest. Tarsus I with 2 terminal setae and a subterminal clawlike structure; tarsi II–IV with well developed padlike caruncles (fig. 1C) bearing a pair of thickened structures medially giving the appearance of claws (these structures are on the ventral surface of the caruncle and each consists of a thickened central part which bears a series of individual, thickened striae running parallel to the long axis of the caruncle and extending to the margin of the caruncle, median striae heavier and longer than lateral ones; proximal of this structure is a smaller but similar shaped line of thickened striae; these structures undoubtedly aid the mite in clinging to the sclerotized body of the host); caruncle thickened proximally and along lateral margins. Lengths of legs, including coxa and caruncle: I, 227μ; II, 355μ; III, 370μ; IV, 380μ. *Gnathosoma*.

Ventrally as in following species (see fig. 3D). Tectum (fig. 1D) consisting of 4 terminal parts, median pair thickest and rakelike in appearance; outer parts ciliated, shorter than median and each bearing a short fingerlike ciliated structure; dorsally a small ciliated pointed structure projects between base of median extensions. Gnathosoma bearing a pair of short, simple setae dorsolaterally midway between idiosoma and palpal trochanter. Chelicerae strongly chelate; excrescence trough-shaped, toothed along both margins, arising from fixed digit (fig. 1E). Palps normal for genus; number of setae per segment as follows: tarsus 6, tibia 7, genu 4, femur 4, and trochanter 1; relative lengths of setae as shown.

DEUTONYMPH. Shape as in female. Idiosoma 480μ long, 370μ wide. *Dorsum*. General features as in female, setae approximately same lengths as in female. *Venter* (fig. 1F). Ventral plate 260μ long, 115μ at widest part; bearing 1 pair of setae; 1 pair pores between coxae II and 1 pair at margin of plate between coxae IV; striations distinct, general pattern as shown; 4 pairs of setae arising from integument, positions and relative lengths as shown. Endopodal plates II, III and IV present, shapes and positions as illustrated. Anal plate diamond shaped; setae 375μ long, of same type as dorsal setae. Peritreme and plate, and tritosternum as in female. Legs and gnathosoma with general features as in female.

Male, protonymph and larva unknown.

Described from 2 females and 2 deutonymphs. Collection data for holotype (female): Costa Rica, Cartago Province; 13-VII-1965; J. Baird, coll.; from alcohol vial containing passalus beetles *Passalus perparvulus* Kuw. and *Pseudacanthus tennis* Kuw. Female paratype and deutonymphs with same date. Holotype and one deutonymph deposited in U. S. National Museum, Washington, D. C., remaining specimens in collection of Department of Entomolgy, University of Georgia, Athens, Georgia.

Brachytremella crossi, n. sp.
(Figs. 2A–J; 4B)

This species is distinct in having the first pair of dorsal setae shorter than the second and in having only 1 heavy spined seta on the dorsum of femora and genua III and IV; adults with the sterni-geniti-ventral plate enlarged posterior to coxae IV and the posterior setae on this plate near the plate's posterior margin; male with a ventral spur on trochanters II and III.

FEMALE. Idiosoma oval, 530μ long, 343μ wide. (Measurements are the average of 3 specimens.) *Dorsum* (fig. 2A). Dorsal plate entire, not extending to posterior and posterolateral margins of body, shape similar to idiosoma. Dorsum with 6 pairs of heavy, spined setae which taper to a small but distinct knob at tip; first 4 pairs arising from margin of plate, last 2 pairs arising from integument behind dorsal plate; anterior pair shortest, up to 200μ long, 2nd pair 298μ long, median pair on integument 291μ long, relative lengths of others as shown. Numerous pores in plate in position of normal mesostigmata setal pattern. *Venter* (fig. 2B). Sternal, metasternal and ventral plates coalesced, 497μ long, 177μ wide between coxae III, constricting to 133μ between coxae IV and 167μ at widest point behind coxae IV; rounded posteriorly; medial area of anterior margin

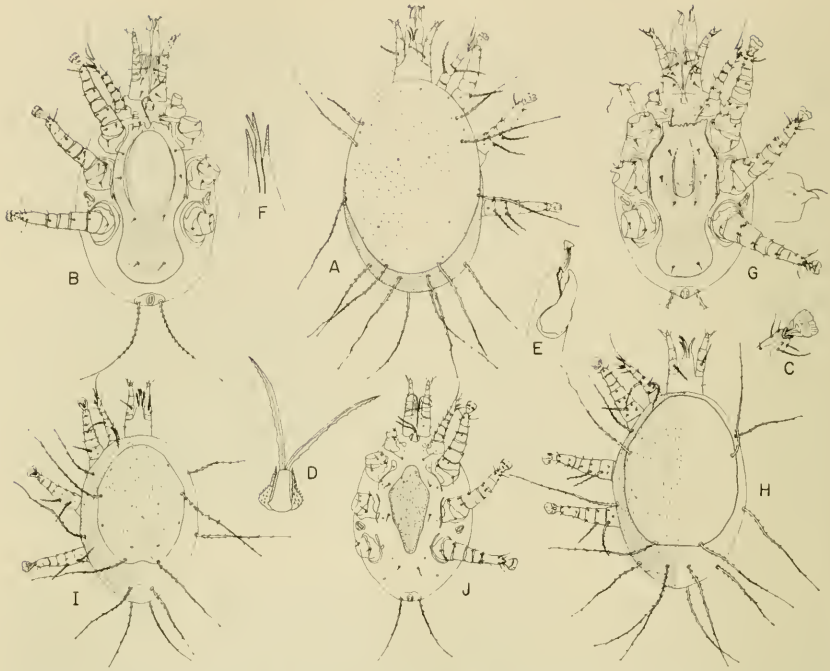

Fig. 2. *Brachytremella crossi*, n. sp. Female: A, dorsum; B, venter; D, tritosternum; E, chelicera; F, tectum. Male: C, venter of tarsus III; G, venter. Deutonymph: H, dorsum. Protonymph: I, dorsum; J, venter.

semisclerotized; 5 pairs of simple setae arising from plate, first pair 2–3 times length of other setae and arising from the semisclerotized area, last pair thickest and located well posterior to coxae IV, positions of other setae as illustrated; light reticulate markings prominent on posterior half of plate; pores on plate as illustrated. Genital plate elongate oval shape, fused to ventral plate; 187μ long, extending from middle of coxae IV to middle of coxae II; sternal plate thickened around genital opening. Anal plate transversely diamond shaped, bearing 2 setae up to 270μ long, of same type as dorsal setae. Endopodal plates II fused with sternal plate; III free, curving around anterior end of coxae III and extending posteromedial of coxa; IV free, encircling coxae IV. Metopodal plates absent. Peritreme short, length approximately 3 times width of stigmata; peritremal plate triangular shaped, surrounding peritreme, knoblike enlargment lateral of stigmata containing a small pore. Tritosternum with 2 flattened lacinae; lacinae membranous with small teeth on lateral margin, slightly thickened medially (fig. 2D); a pair of ciliated setae flanking base. *Legs.* Chaetotaxy given in table I. Leg I 183μ long; with 2 terminal setae, anterior seta as long as combined length of tarsus and tibia, posterior seta half that long; subterminal clawlike group of setae arising from posterior dorsal margin of tarsus (see fig. 3B); femur I and genu I each with a spined, heavy dorsal seta, other setae simple. Coxa I fragmented, medial seta arising from integument. Tarsi II–IV with a pair of

long slender ventral setae; large pad like membranous caruncle with thickened area resembling claws on ventral surface. Femora II, III and IV and genua III and IV each with a heavy spined seta dorsally. Lengths, including coxa and caruncle, of legs II–IV: II, 277μ; III, 273μ; IV, 275μ. *Gnathosoma.* Tectum consisting of 2 lateral anterior extensions and a median extension which is split at the tip for about ⅓ its length, all extensions ciliated (fig. 2F). Palpal setae simple except for heavy, spined seta arising from dorsum of femur; remaining setae short except for 2 longer setae on tibia and 1 on tarsus; relative positions as shown in fig. 3D. Deutosternal groove without teeth; 3 pair of ventral setae, anterior hypostomal setae twice length of posterior pair; capitular setae about as long as posterior hypostomal setae; hypostomal process (internal malae) long, feathered, curving anterior to the long sclerotized corniculi. Chelicerae chelate, fixed digit bearing a trough-shaped excrescence which is smooth on the lateral margins and arrowhead-shaped at tip (fig. 2E). A short simple seta on each dorsolateral margin of gnathosoma about midway between idiosoma and palpal trochanter.

MALE. Shape as in female, idiosoma 493μ long, 317μ wide. (Measurements are the average of 3 specimens.) *Dorsum.* Plate entire, surrounded posteriorly and posterolaterally by integument as in female; furnished with 6 pairs of spined, tapering, capitate setae of type and arrangement as in female, anterior pair 187μ long, second pair 280μ long, median pair on integument 273μ long. *Venter* (fig. 2G). Sternal, metasternal and ventral plates coalesced, 353μ long, 153μ wide between coxae III, 92μ between coxae IV, 167μ at greatest width behind coxae IV; posterior margin of plate rounded, anterior margin irregular in outline, semisclerotized medially; plate lightly reticulated; 1 pair of pores at margin of plate at posterior level of coxae II; bearing 4 pairs of setae, anterior pair longest, relative lengths and positions as illustrated. Genital plate 148μ long; transverse suture near posterior margin; internal kidney-shaped genital structure at each posterolateral margin of genital plate. Endopodal plates II, III and IV present and as in female. Anal plate wider than long, slightly bilobed from weak constriction medially; furnished with 2 setae of type occurring on dorsal plate; seta 257μ long. Peritreme, peritremal plate and tritosternum as in female. *Legs.* Chaetotaxy as given in table 1. Leg I, 177μ long. Leg II thickest, 282μ long; with a bilobed setigerous spur on venter of trochanter (fig. 2G). Leg III 273μ long bearing prominent slightly curved spur on ventrum of trochanter with ventral seta of trochanter arising from the lateral margin of this spur (fig. 2G). Leg IV 290μ long. Except for spurs on trochanter II and III chaetotaxy as in female. Tarsi II–IV without claws; well developed padlike caruncle with basal part thickened, terminal part membranous; a pair of sclerotized clawlike structures at terminal end of tarsi (fig. 2C). Gnathosoma with general facies as in female. Movable digit of chelicera with excrescences as in female.

DEUTONYMPH. Shape as in female; idiosoma 433μ long, 291μ wide. (Measurements are the average of 4 specimens.) *Dorsum* (fig. 2H). Plate entire, surrounded by integument; truncate posteriorly, otherwise with general shape of idiosoma. Dorsum bearing 6 pairs of spined, tapering, capitate setae, 2 pairs arising from dorsal plate, 4 pairs from integument; anterior pair of setae 159μ long, second pair 260μ long, relative lengths of remaining setae as shown. *Venter* (fig. 4B). Ventral plate 253μ long, 112μ at greatest width, shape as

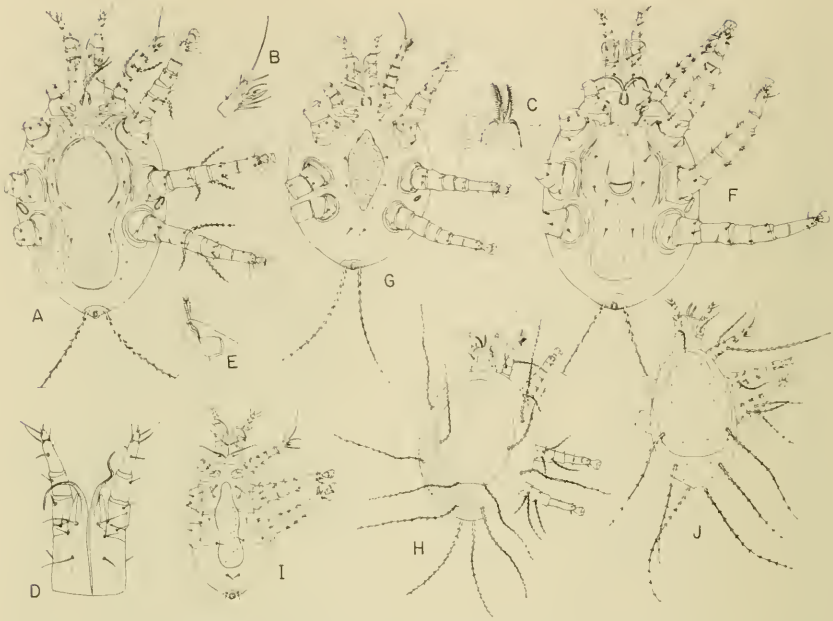

Fig. 3. *Brachytremella cartwrighti*, n. sp. Female: A, venter; B. tarsus I, ventral view; C, tectum; D, ventral view of gnathosoma; E, chelicera. Male: F, venter. Protonymph: G, venter; H, dorsum. Larva: I, venter; J. dorsum.

figured; anterior margin thickened and without reticulate pattern of remainder of plate; 1 pair of pores at margin where thickened area begins, a pair of porelike structures in plate behind coxae III; 5 pairs of ventral setae, fourth pair arising from ventral plate, remaining setae on integument, relative lengths as illustrated. Endopodal plates II, III and IV present; II widened anteriorly and bearing a pore, III rodlike, IV curving posteriorly around coxae IV. Integument bearing 5 pairs of pores, largest pair located medial of fragmented coxae I, position of others as shown. Anal setae 213μ long; anal plate as illustrated. Tritosternum, peritreme and peritremal plate as in female. *Legs.* Chaetotaxy (see table 1) and caruncle as in female. *Gnathosoma.* General features as in female; chelicera with excrescence on fixed digit.

PROTONYMPH. Idiosoma 400μ long, 280μ wide (based on two specimens). *Dorsum* (fig. 2I). Plate truncate posteriorly; not extending to margins of body. Bearing 5 pairs of spined, tapering, capitate setae; second and fourth pairs of setae on plate; first pair 140μ long, second 250μ long, relative lengths of other setae as shown. *Venter* (fig. 2J). Ventral plate without setae; shape as shown, 230μ long, 100μ at greatest width; margins thickened and without reticulations which cover remainder of plate; one pair of pores at margin medial of coxae II. Integument bearing 5 pairs of pores and 4 pairs of setae, anterior pair of setae longest, posterior pair longer than second or third pairs. Endopodal plates as in deutonymph. Anal setae same type as on dorsum, 160μ long; shape of anal

plate as illustrated. Tritosternum as in adults. Peritreme shorter than in adults, plate more oval, bearing 1 pore posterolateral of stigmata. *Legs.* Chaetotaxy discussed below. Pretarsi II–IV with caruncle as in female; genua and femora I, III and IV and femur II each with a single heavy, spined seta dorsally. *Gnathosoma.* General features as in adult. Palpal tibia without setae, genu with 1 dorsal setae (one less on each of these segments than in adults), ventrally no seta on trochanter, remaining segments as in deutonymph.

Described from 3 females, 3 males, 4 deutonymphs and 3 protonymphs. Holotype (female) data: Costa Rica, Heredia Province; 8-II-1965; J. Baird, coll.; from alcohol vial containing passalid beetles *Passalus perparvulus* Kuw. and *Pseudacanthus tennis* Kuw. One female, 1 male, 4 deutonymphs, and 2 protonymph with same data as holotype. One female and 1 male from Turrialha, Costa Rica; March, 1965; M. V. Truitt, coll.; from passalid (*Passalus*) beetle. One deutonymph from Cerro Meurte, Costa Rica; 5-II-1965; M. V. Truitt, coll.; from passalid (*Passalus*) beetle. The male and female from Turrialha had longer dorsal setae and differed in other minor characters from Heredia Province specimens, but major taxonomic characters were as in the Heredia Province material. Holotype, male paratype, 2 deutonymphs and protonymph deposited in U. S. National Museum, Washington, D. C., remaining paratypes in collection of Department of Entomology, University of Georgia, Athens, Georgia.

Brachytremella cartwrighti, n. sp.
(Figs. 3A–J; 4A, C, D)

This species is distinguished by having the second pair of dorsal setae shorter than other dorsal setae; in having 2 spined setae arising from femora III and IV; and in the adults the ventral plate widening slightly behind coxae IV with the last pair of setae on this plate located at the level of coxae IV.

FEMALE. Oval shape; idiosoma 590μ long, 400μ wide. (Measurements are the average of 2 specimens.) *Dorsum* (fig. 4C). Dorsal plate with a rounded extension between fourth pair of dorsal setae; surface of plate with faint polygonal reticulate patterns. Dorsal setae I–IV arising from margin of dorsal plate, the 2 remaining pairs arising from the integument posterior of the plate; second pair of setae shortest, 290μ long, first pair 400μ long, remaining setae approximately equal to first pair in length. *Venter* (fig. 3A). Sternal, metasternal and ventral plates coalesced, 430μ long, 218μ at widest part between coxae III, 133μ between coxae IV, 158μ behind coxae IV; anterior sternal area semisclerotized, sternal setae 1 arising from this area; 5 pairs of setae arising from the coalesced ventral plates, first pair longest, last pair next longest and remaining 3 pairs of equal length, positions of setae as shown; linear reticulations around genital opening, faint polygonal type pattern posteriorly; plate bearing 4 pairs of pores—1 pair between coxae II, a pair between coxae III and 2 pairs in the area of coxae IV.

Genital plate rounded, 188μ long, extending from level of anterior margin of coxae IV to middle of coxae II, thickened around free margins. Endopodal plate II fused to sternal plate for ¾ its length, posterior ¼ free; endopodal III

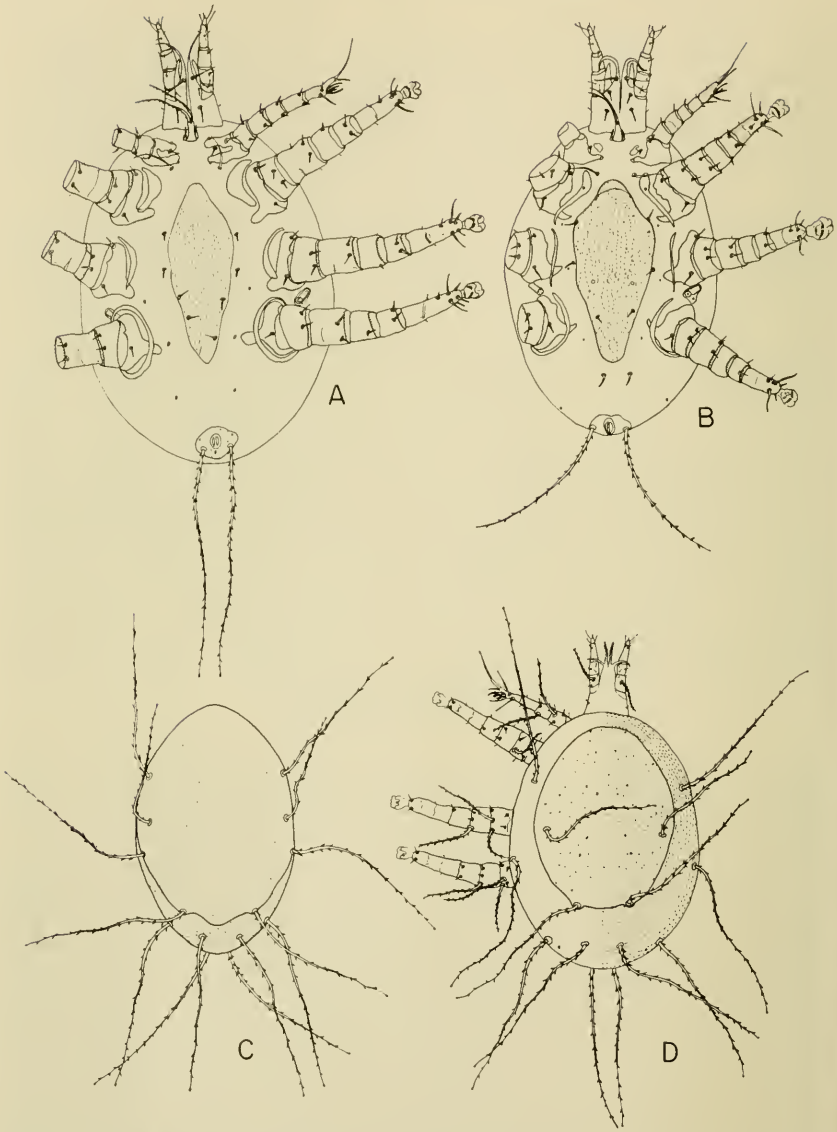

Fig. 4. *Brachytremella cartwrighti*, n. sp. Deutonymph: A, venter; C, dorsum. Female: D, dorsum. *Brachytremella crossi*, n. sp. Deutonymph: B, venter.

free, anteriorly curving around coxae III; endopodal IV free, encircling coxae IV. Peritreme short, stigmata lateral to and between coxae III and IV, peritremal plate same shape as peritreme and only slightly larger than peritreme. Tritosternum consisting of base flanked by a pair of ciliated setae and 2

lacinae. Anal plate diamond shaped, wider than long; bearing 2 setae, up to 410μ long, of type on dorsum. Integument behind coxae IV with 3 pairs of pores along margin of ventral plate. *Legs.* Chaetotaxy given in table 1. Leg I 240μ, coxa deeply concaved medially; subterminal clawlike structure on tarsus (fig. 3B); genu and femur each with a spined, heavy dorsal seta, other setae simple; tarsi II–IV each with large caruncle, ventrally bearing a thickened area resembling claws; leg II 350μ long bearing a heavy, spined dorsal seta on femur, other setae simple; leg III 375μ long, IV 385μ long; femora III and IV each with 2 heavy, spined setae dorsally, genua III and IV each with one such seta. Relative lengths of setae as shown. *Gnathosoma.* Tectum (fig. 3C) consisting of 4 terminal fingerlike structures, medial pair heaviest, directed straight forward, lateral filaments curving posteriorly. Palps typical for genus, femur with a heavy, spined seta dorsally. Hypostomal processes and gnathosomal setae as illustrated (fig. 3D). Chelicera strong, chelate, fixed digit bearing a trough-shaped excrescence which is toothed along each lateral margin (fig. 3E).

MALE. Shape oval, widest posteriorly. Idiosoma 595μ long, 412μ wide. (Measurements are average of 2 specimens.) *Dorsum.* Dorsal plate entire 510μ long, 412μ wide; dorsal setae of same type and position as in female. *Venter* (fig. 3F). Sternal, metasternal and ventral plates coalesced, total 400μ, 210μ between coxae III, 130μ between coxae IV and widening to 160μ behind coxae IV; area anterior of sternal setae I semisclerotized, a pair of large pores between semisclerotized area and coxae I, similar pores present in female. Genital plate 150μ long, consisting of two plates—a smaller posterior plate and an elongate anterior plate; a pair of sclerotized internal structures where the 2 plates join; reticulations not forming a distinct pattern. Anal plate as in female, setae up to 440μ long. Endopodal plate II free of sternal plate for posterior $\frac{2}{3}$ its length, anterior part fused to sternal plate; endopodal III not extending as far around anterior part of coxa III as in female; endopodal IV as in female. Peritreme and tritosternum as in female. *Legs.* Chaetotaxy as in female; tarsi II–IV with distinct clawlike sclerotized structure at terminal end of segment; caruncle without the thickened claw-resembling structure of female. Lengths: I, 260μ; II, 415μ; III, 435μ; and IV, 485μ long. *Gnathosoma* as in female.

DEUTONYMPH. Idiosoma shape as in female. *Dorsum* (fig. 4D). Single dorsal plate 365μ long, 250μ wide, completely surrounded by integument; pores on plate as shown; faint reticulation pattern. Six pairs of spined, heavy dorsal setae of type described for female, second and fourth pairs arising from dorsal plate, others from integument; first pair arising from integument 373μ long; 2 pores in integument behind plate. *Venter* (fig. 4A). Ventral plate 258μ long, 108μ at greatest width; shape as shown; linear reticulations on surface; 2 pairs of setae arising from surface of plate in the area of coxae IV; sternal setae I, II and III arising from integument; relative lengths and positions of setae as shown. Anal plate transverse diamond shape, 2 tapering, capitate setae of type on dorsum; setae up to 392μ long. Endopodal plates II widening medially, plates IV encircling coxae IV medially, plates III medial of coxae III. Peritreme and tritosternum as in female. *Legs.* Chaetotaxy as in female. Femora III and IV with 2 spined setae dorsally as in female; relative lengths of dorsal and ventral setae as shown. Lengths of legs as follows: I, 223μ; II, 333μ; III, 343μ; IV, 357μ.

PROTONYMPH. Idiosoma oval. *Dorsum* (fig. 3H). Plate entire, 320μ long,

250μ wide (average of 3 specimens), surrounded by integument. Five pairs of dorsal setae, of type described for female; first pair 310μ long, second pair 260μ long, posterior pair 320μ long; second and fourth pair arising from dorsal plate, others from integument. *Venter* (fig. 3G). Ventral plate elongate diamond shape, distinct reticulation pattern, pores at each lateral margin of plate between coxae II; 4 pairs of ventral setae, all arising from integument, relative lengths and positions as shown. Anal plate bearing 2 long setae of type on dorsum, setae up to 320μ long. Endopodal plate II triangular, bearing a pore; III and IV encircling their respective coxae. Peritreme length 2–3 times width of stigmata, surrounded by plate only slightly larger than peritreme. Tritosternum as in female. *Legs.* Heavy spined dorsal setae as in female, other setae simple; chaetotaxy discussed below. Ridged sclerotized structures on venter of caruncle resembling claws. Leg lengths as follows: I, 200μ; II, 290μ; III, 300μ; IV, 300μ. *Gnathosoma.* Venter and tectum as in female. A short simple seta on each dorsolateral margin midway between base of palps and base of gnathosoma. Chelicerae as in adults.

LARVA. Idiosoma oval, widest posteriorly. *Dorsum* (fig. 3J). Dorsal plate 280μ long, 180μ at greatest width, shape as shown; 2 pairs of spined, tapering, capitate setae, one pair arising from plate, second pair—up to 310μ long—arising from integument behind plate; 3 pairs of pores in integument—2 pairs behind plate, 1 pair near base of setae which arise from dorsal plate. *Venter* (fig. 3I). Ventral plate weakly sclerotized, surface bearing numerous small circular markings; plate constricted between coxae III, ventral setae arising from integument, first pair longest, relative lengths of others as shown. Endopodal plate II rectangular, bearing a pore at the posterolateral corner. Anal plate bearing 2 spined, capitate setae of type on dorsum, setae up to 330μ long. Tritosternum as in adults; peritremes absent. *Legs.* Coxa I fragmented, both setae of coxa I arising from nonsclerotized areas, pore associated with each coxal area. Leg I with a spined, heavy seta on dorsum of femur and genu, that of genu 275μ long; tarsus with subterminal clawlike setae as in female; other setae simple. Leg II with spined, heavy seta on dorsum of femur. Leg III with 2 spined setae on dorsum of genu, 1 on femur. Tarsi II and III without true claws, with sclerotized ridges in position of and giving appearance of claws. Lengths of legs as follows: I, 170μ; II, 270μ; III, 265μ long. *Gnathosoma.* Venter with 2 pairs of setae; corniculi extending anteriorly and laterally as in adults. Tectum as in adults. Palp with a spined, heavy seta on dorsum of femur, other setae simple; trochanter without setae. Without dorsolateral seta at margin midway between palpal base and posterior of gnathosoma.

Described from 2 female, 2 males, 1 deutonymph, 3 protonymphs and 1 larva. All specimens with same data as holotype. Holotype (female) data: Costa Rica, Heredia Province; 8-II-1965; J. Baird, coll.; from alcohol vial containing passalid beetles, *Pseudacanthus tennis* Kuw. Holotype, male paratype, 2 deutonymphs, protonymph and larva deposited in U. S. National Museum, Washington, D. C.; remaining specimens in Department of Entomology, University of Georgia, Athens, Georgia.

Leg Chaetotaxy. The leg chaetotaxy was the same in the deuto-

nymph, female and male. Following the system of Evans (1963), the chaetotaxy, including species variations, is given in table 1. Of interest is the absence of the posterior distal seta on the dorsum of femora III and IV in *B. crossi*. In the other two species two long, heavy, spined distal setae arise from the dorsum of this segment. *B. crossi* also has one less dorsal seta on trochanter IV compared to the other species. The study of additional species would provide information as to whether or not the number of setae on these segments in *crossi* represents the loss of a seta from the basic pattern.

B. crossi and *cartwrighti* each add the same setae, in number and position, to the protonymphal formula to provide the deutonymph-adult pattern given in table 1. The setae added are as follows: trochanter—IV adds one seta; femur—II and III add one ventral seta each, IV adds two ventral and one posterolateral setae; tarsi—II, III, and IV each add one median dorsal seta.

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A NEW NAME COMBINATION IN PODOTHRIPS HOOD, 1913
(THYSANOPTERA: PHLAEOTHRIPIDAE)

Kurosawa (1937, Kontyu 11 (3): 266–275, figs. 1–2, pl. 1), described *Haplothrips* (*Hindsiana*) *odonaspicola* from males and females found under bamboo sheaths in association with *Odonaspis secreta* (Cockerell), in Tokyo (type locality); Iwate; Gora, Hakone; Yokohama; and Yakeyama, Kanagawa, Japan. A pair of Tokyo paratypes in the U.S. National Museum closely resemble *Podothrips semiflavus* Hood (1913, Insecutor Inscitiae Menstruus 1 (6): 65–70, figs. 1–5), in morphology. In *semiflavus*, the type-species of *Podothrips*, the body and appendages are yellow except for the head, ends of the antennae, sides of the metathorax, small areas behind antecostas of abdominal terga III–VII, and abdomen beyond antecosta of VIII, which are brown. In *Podothrips odonaspicola* (Kurosawa), **n. comb.**, the fore femora, pro- and metathorax, and sides of abdomen VII are also brown, and brown portions of the bases and apices of the antennae are more extensive. The type-species was found in association with *Odonaspis* sp. and *Targionia sacchari* (Cockerell), under leaf sheaths of *Panicum barbinode* Trin., at Guanica, Puerto Rico.—KELLIE O'NEILL, *Systematic Entomology Laboratory, Entomology Research Division, ARS, U.S. Department of Agriculture, Washington, D.C. 20250.*

THE GENUS CAULOCAMPUS ROHWER
(HYMENOPTERA: TENTHREDINIDAE)

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Caulocampus Rohwer is a small genus in the subfamily Nematinae and is known only from eastern North America. Specimens representing a new species of *Caulocampus* were discovered in a collection of sawflies received from R. W. Matthews, Harvard University. I take this opportunity to describe this species and present a review of the genus.

Caulocampus Rohwer

Caulocampus Rohwer, 1912, Proc. U. S. Nat. Mus. 43:239; Ross, 1937, Ill. Biol. Monogr. 15:75, 77; Ross, 1951, *in* Muesebeck, *et al.*, U. S. Dept. Agr., Agr. Monogr. 2:34.

Type-species.—*Priophorus acericaulis* MacGillivray. Monotypic and original designation.

Description.—Antenna with 2nd segment as long as or longer than broad; 3rd segment slightly longer than 4th segment. Clypeus truncate; malar space narrow, less than diameter of front ocellus. Tarsal claw with a long inner tooth; outer tooth bent over at a sharp angle. Prepectus present, sometimes indistinct, separated from mesepisternum by a suture. Forewing with vein 2r present; vein 2A and 3A present, curved up and joining 1A forming a small basal cell. Hind wing with anal cell present.

This genus falls in the group of Nematinae in which the vein 2A and 3A in the forewing joins 1A and forms a small basal cell. It may be separated from related genera by the long second antennal segment, narrow malar space, and truncate clypeus and from *Hoplocampa*, the genus with which it is most likely to be confused, by the absence of vein 2r in the forewing and the sharply bent-over outer tooth of the tarsal claw. There are now 2 species known from North America.

KEY TO SPECIES

1. Thorax and abdomen entirely black; sheath rounded at apex (fig. 6); 2nd antennal segment ½ or less length of 8th segment (fig. 4) ..... **matthewsi**, n. sp.

   Thorax, except dorsum, and abdomen entirely yellowish; sheath pointed at apex (fig. 5); 2nd antennal segment more than ½ length of 8th segment (fig. 3) ..... **acericaulis** (MacGillivray)

Caulocampus acericaulis (MacGillivray)

Priophorus acericaulis MacGillivray, 1906, Can. Ent. 38:306, ♀; Britton, 1906, Ent. News 17:313–320.

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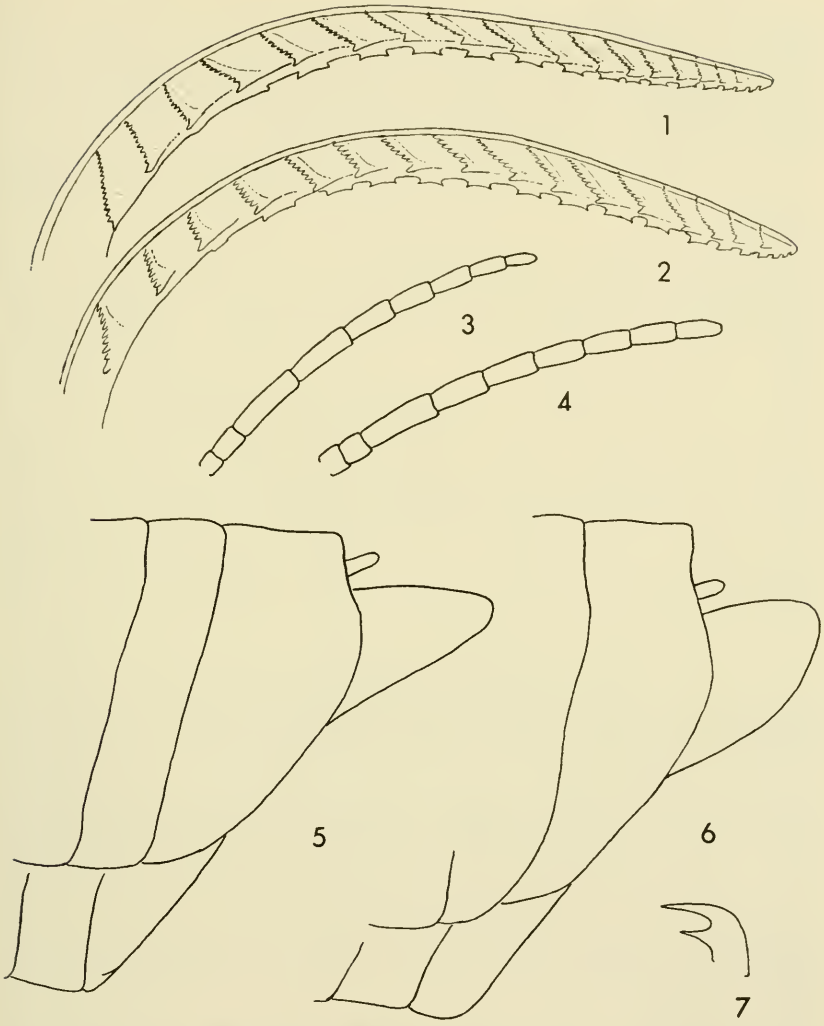

Figs. 1, 3, 5, 7, *Caulocampus acericaulis* (MacGillivray): 1, lancet; 3, antenna; 5, apex of abdomen and sheath; 7, tarsal claw. Figs. 3, 4, 6, *matthewsi*, n. sp.: 2, lancet; 4, antenna; 6, apex of abdomen and sheath.

Caulocampus acericaulis, Rohwer, 1912, Proc. U. S. Nat. Mus. 43:239; Rohwer, 1922, Proc. U. S. Nat. Mus. 60:37; Yuasa, 1922, Ill. Biol. Monogr. 7:69; Ross, 1951, *in* Muesebeck, *et al.*, U. S. Dept. Agr., Agr. Monogr. 2:34; Maxwell, 1955, Can. Ent. 81 (Suppl. 1):63.

Female.—Length, 4 mm. Antenna black with first 2 segments yellowish; head black with clypeus and all mouthparts yellowish. Thorax yellowish with

mesonotum and metanotum black. Legs and abdomen entirely yellowish. Wings hyaline.

Antenna with 2nd segment longer than broad and more than ½ length of 8th segment. Prepectus distinct. Sheath narrow and pointed at apex (fig. 5). Lancet as in fig. 1; teeth of annuli small and numerous.

Male.—Unknown.

Type locality.—New Haven, Conn., May 15, 1906, B. H. Walden, collector.

Location of type.—MacGillivray's type is in the collection of the Illinois Natural History Survey, Urbana.

Distribution.—Northeastern: Connecticut, Illinois, Michigan, New York, Ontario.

Host.—The larva mines in the petioles of maple leaves. Britton (1906) recorded the host as sugar maple, "*Acer saccharum* Marsh."

Discussion.—This species received attention in 1906 when it was found causing injury to sugar maple in Connecticut. Britton (1906) stated that the leaves begin to fall in late May or early June due to the feeding of this species and that only the blades fall, leaving part of the petiole on the tree. In some cases one-third of the leaves dropped from a single tree. Britton (1906) and Yuasa (1922) described the larva.

Caulocampus matthewsi, n. sp.

Female.—Length, 4 mm. Antenna and head black; clypeus and mouthparts yellowish. Thorax and abdomen entirely black; tegulae white. Legs entirely yellowish. Wings hyaline.

Antenna with 2nd segment as long as broad, equal to, or less than ½ length of 8th segment. Malar space slightly less than diameter of front ocellus; clypeus truncate. Prepectus present but sometimes indistinct, separated from mesepisternum by a suture. Tarsal claw with a long inner tooth; outer tooth sharply bent over. Forewing with 2r absent; base of vein 2A and 3A present, joining 1A and forming a small basal cell. Hind wing with anal cell present. Sheath broad, rounded at apex (fig. 6). Lancet as in fig. 2, teeth of annuli larger and fewer in number than in *acericaulis*.

Male.—Unknown.

Holotype.—Female, New York, Albany Co., nr. Rensselaerville, Huyck Preserve, 1 June 1967, Coll. Malaise trap 1, R. and J. Matthews. Deposited in the collection of the Museum of Comparative Zoology, Harvard University.

Paratypes.—NEW YORK: same data as holotype, June 9, 1967 (1♀); same data as holotype, June 5, 1967, Malaise trap 2 (1♀). Deposited at the Museum of Comparative Zoology and U. S. National Museum.

Host.—Unknown.

Discussion.—This species differs from *acericaulis* by its darker color, longer antenna and shorter second antennal segment, and

broader and more rounded sheath. The lancets of the two species are similar except for the teeth of the annuli which are larger and fewer in number in *matthewsi*.

The specimens were collected in a Malaise trap, and the host is not known; however, judging from the structure of the lancet, the habits of *matthewsi* may be similar to those of *acericaulis*. Both species of this genus were collected in the same locality.

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A NEW MICROVELIA FROM THE GALÁPAGOS (HEMIPTERA: VELIIDAE)[1]

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The following paper is based on the material collected by members of the Galápagos International Scientific Project, 1964.[2] This material, exclusive of types, has been divided among the following individuals and institutions: California Academy of Sciences, R. L. Usinger, P. D. Ashlock, U. S. National Museum, B. P. Bishop Museum and J. T. Polhemus.

Up to this time, no Veliidae have been recorded from the Galápagos, and only one species is represented in the material at hand.

Microvelia ashlocki, n. sp.

APTEROUS MALE: Moderately long, slender, dark, ground color of dorsum blackish brown; broad area between eye and median dark stripe on vertex of head, broad stripe as wide as head on pronotum, broad median areas on both lobes of mesonotum and first 3 abdominal segments velvety red brown; tergites 2 and 3 gray-blue pruinose externally; broad median areas of tergites 4, 5, 6, and 7 glabrous yellow brown; connexivum yellowish to red brown along tergite 1, faintly so basally along tergites 2 and 3; ventral surface orange brown, dull, broadly striped along the sides with blackish-bluish pruinose; covered with fine pubescence and scattered semi-short hairs, genital segments more longly hairy. Head convex above, with distinct median furrow, greyish pruinose near the eyes; width across eyes 0.45 mm. Rostrum testaceous, becoming black-fuscous apically, reaching to anterior one-fourth of mesosternum. Antennae long, slender,

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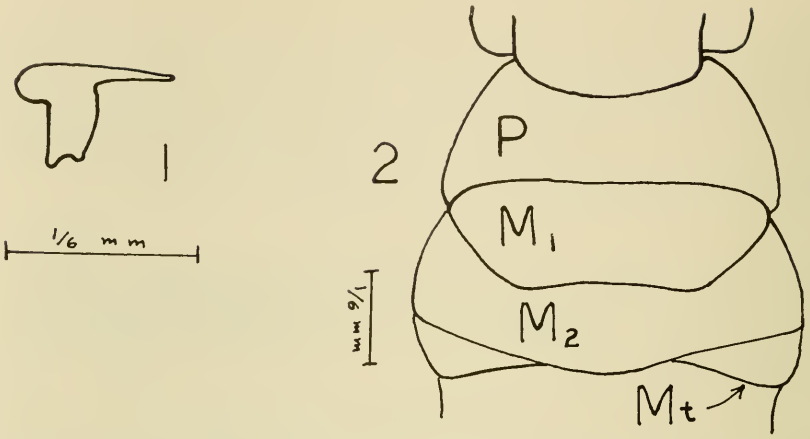

Figs. 1 and 2, *Microvelia ashlocki*, n. sp.: 1, left ♂ paramere; 2, thorax, dorsal view, apterous ♂. Abbreviations: P, pronotum; M1, mesonotum lobe 1; M2, mesonotum lobe 2; Mt, metanotum.

brownish fuscous apically, basal fourth of segment 1 testaceous, shortly pilose with scattered longer hairs; length of antennal segments I–IV, 14:11:19:20 (60 units = 1 mm). Legs moderately slender, brownish fuscous, femora pale testaceous basally, unarmed femora slender, not swollen, hind femora thickest; tibia each with a row of evenly spaced long hairs directed anteriorly or inward; posterior tibia curved slightly, lighter at apex; middle tarsus with segment 1 shorter than 2 (8:10), hind tarsus with segments equal (10:10).

Pronotum truncate, not produced posteriorly, (fig. 2), four times as wide as long (36:9), convexly raised transversely, somewhat depressed at the sides of the convex medial portion; metanotum distinctly divided into 2 lobes, anterior lobe slightly longer than posterior lobe on median line (11: 9), anterior lobe truncate behind with sides sloping sharply antero-laterally, excavated behind forming depressed glabrous areas on posterior lobe; metanotum visible only at postero-lateral corners.

Abdominal tergites scarcely narrowed posteriorly, last tergite tiwce as long as preceding segment; connexivum tilted upward, broad; venter flattened, concave medially, last segment almost twice as long as preceding segment (18:10); genital segments large, fuscous, clothed with semi-long hairs, as long as tergite 7 (18:18); first genital segment semi-quadrate, lateral margins slightly rounded, narrowing somewhat caudad, roundly excavated behind; second segment rounded, protruding caudad from first. Paramere as in fig. 1. Length 2.4 mm, width 1.4 mm (across mesonotum).

APTEROUS FEMALE: Broader than male, sub-fusiform; head uniformly dark on vertex, median markings on mesonotum and tergites dark red-brown; grey-blue lateral pruinose areas on tergites 2 and 3 broad; glabrous median areas on tergites 6, 7 and 8 dark yellow brown.

Connexivum broader than in male, almost vertical; venter somewhat flattened medially, but convex throughout; entire body devoid of semilong hairs (except

head); long hairs on tibia much shorter than in male. Other characteristics as in male. Length 2.3 mm., width 1.8 mm. (across connexivum, tergite 4).

MACROPTEROUS FORM: Pronotum blackish-fuscous with a transverse flavous band behind head, moderately convex across humeri, wider across humeri than long (49:38), with dark median line, humeri raised. Hemelytra rather dark grey brown fumose, veins darker, with an elongated white area along posterior margin of pronotum, slender grey white to white area arising at base and extending caudad one-third of wing length, elongate grey white to white spot at apex; sometimes with semi-light areas between wing veins medially.

Venter darker than in apterous forms, sometimes uniformly blue-grey in females. Other characters as in apterous forms.

MATERIAL: Holotype apterous ♂, Allotype apterous ♀, Morphotype macropterous ♀, (all in the California Academy of Sciences) and paratypes 5 ♂♂ apterous, 7 ♀♀ apterous, 5 ♀♀ macropterous, Galápagos, Academy Bay, Santa Cruz Is., I-22-1964, P. D. Ashlock Collector. Also, additional paratypes as follows: 5 ♀♀ apterous, 1 ♂ macropterous, 5 ♀♀ macropterous, Galápagos, Academy Bay, Santa Cruz Is., I-22-1964, P. D. Ashlock Collector; 3 ♂♂ apterous, 4 ♀♀ apterous, Galápagos, Darwin Sta., Academy Bay, Santa Cruz Is., January 25, 1964, R. L. Usinger; 5 ♂♂ apterous, 18 ♀♀ apterous, 4 ♀♀ macropterous Galápagos Arch., Santa Cruz Is., Academy Bay, Darwin Research Station, 28-I-1964, R. O. Schuster; 11 ♂♂ apterous, 14 ♀♀ apterous, 1 ♀ macropterous Galápagos Arch., Santa Cruz Is., Academy Bay, Darwin Research Station, 25-I-1964, D. Q. Cavagnaro and R. O. Schuster; 1 ♀ apterous, Galápagos Arch., Isla Darwin, 29-I-1964, D. Q. Cavagnaro.

VARIABILITY: The types are among the lighter colored specimens of the series. In the darkest males, the orange yellow transverse band on the pronotum, a slight medial lightening on the mesonotum and deep orange brown glabrous areas on tergites 5, 6, and 7 are the only body markings. In the darkest females only the orange band on the pronotum and faintly lighter areas on tergites 6, 7, and 8 remain, and the glabrous areas are not so shining as in the lighter specimens.

The variations in body measurements are as follows: ♂♂; length, 2.95 mm, max., 1.85 mm, min; width, 0.95 mm, max., 0.60 mm, min: ♀♀; length, 2.50 mm, max., 1.90 mm, min; width, 1.00 mm, max., 0.85 mm, min.

COMPARATIVE NOTES: This species closely resembles *Microvelia pulchella* Westwood both in size and shape, and the pronotum and mesonotum have the same form (fig. 2). (For a splendid figure of *Microvelia pulchella*, see Cobben, 1960). *Microvelia ashlocki* differs from *Microvelia pulchella* in that it has longer antennae, glabrous areas on several of the posterior abdominal tergites and a different general coloration.

As *Microvelia ashlocki*, n. sp., seems most closely allied to *Microvelia*

pulchella, a neotropical species, it is presumed to have been derived from tropical America.

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PLANT MATERIALS AS BREEDING PLACES OF PANAMA CULICOIDES (DIPTERA: CERATOPOGONIDAE)[1]

Earlier records summarized by Wirth and Blanton (1959, Proc. U.S. Nat. Mus. 109:237–482) and more recent investigations by Williams (1964, Ann. Ent. Soc. Amer. 57:462–466) have indicated that plant materials are an important larval habitat for *Culicoides* in the tropics, much more so than in the more temperate areas of the world. During a month's stay in the Panama Canal Zone in July, 1967, we were able to devote a small portion of our time to a search for *Culicoides* breeding places in plant materials. Materials suspected of affording suitable larval habitats were collected in the field and brought into our quarters in plastic bags or glass containers for observation. All predatory arthropods and adult insects which were observed were removed daily and preserved in alcohol for determination. If adult ceratopogonids were observed, a portion of the sample was carefully examined under the dissecting microscope to find the larvae, if possible, and to note their activities. Although our very limited time and facilities seriously restricted our choice of plant materials, we were successful in finding two habitats which nearly always contained *Culicoides* larvae.

1. The rotting spadices of the Panama hat palm or "Jipajapa," *Carludovica palmata* Ruiz and Pavón, yielded 9 records of *Culicoides hylas* Macfie, 4 of *fluvialis* Macfie, 1 of *diabolicus* Hoffman, and 1 of *pusilloides* Wirth and Blanton. Collections were usually negative when they were severely infested with ants, or if healthy seeds had developed in the fruits.

2. Older decaying inflorescences of the "beefsteak heliconia," *Heliconia mariae* Hooker f., yielded *Culicoides castillae* Fox 6 times, this host being negative only when infested severely by ants.

Numerous collections were made from the upright bracts of other *Heliconia* species which hold quantities of water and often breed mosquitoes. These were usually negative for *Culicoides*, but we obtained 2 records of *Culicoides heliconiae* Fox and Hoffman from bracts of *Heliconia latispatha* Bentham in which the flowers were old and decomposing.—MABEL O. WIRTH, WILLIS W. WIRTH, *and* FRANKLIN S. BLANTON. First and third authors: *Department of Entomology, University of Florida, Gainesville.* Second author: *Systematic Entomology Laboratory, Entomology Research Division, ARS, USDA, c/o U.S. National Museum, Washington, D.C. 20560*

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NOTES ON THE TAXONOMIC CHARACTERS AND DISTRIBUTION OF AEDES ALOPONOTUM DYAR AND AEDES COMMUNIS (DE GEER) (DIPTERA: CULICIDAE)

C. M. GJULLIN[1], L. F. LEWIS, *and* D. M. CHRISTENSON, *Entomology Research Division, ARS, U. S. Department of Agriculture, Corvallis, Oregon 97330*

Aedes aloponotum was described by Dyar (1917) from material he collected in the Mt. Rainier and Hoodsport regions in Washington and from the lower Fraser Valley in British Columbia. The only character that Dyar (1928) found useful in separating this species from *A. excrucians* (Walker) was the color of the scales of the female mesonotum, but it was not clear that this character was always reliable. Dyar also indicated that *A. aloponotum* might be a race of *A. excrucians*, and in the following years, it was considered a synonym of *A. excrucians* by several authors.

Larvae of *A. aloponotum* collected in the vicinity of Seattle, Washington were found by Boddy (1948) to have double abdominal hairs on the 1st to the 6th segments. Thus it was possible to separate these larvae from those of *A. excrucians* which usually have single abdominal hairs on the 3rd to the 6th segments. Stone et al. (1959) therefore reinstated *A. aloponotum* as a species.

In collections we made from two pools on Bainbridge Island, Washington, all the emerging adults had the reddish mesonotum of *A. aloponotum* described by Dyar. Also, the females had claws with the tooth projecting at an angle from the main claw. This character is useful in separating the females of this species from those of *A. excrucians* in which the tooth parallels the main claw (fig. 1).

In 1965–66, larvae of *A. aloponotum* were found near Idanha and Marion Forks in Marion County, Oregon. No larvae of *A. excrucians* were found there, but *A. fitchii* Felt and Young and *A. aboriginis* Dyar were present, and *A. hexodontus* Dyar was found occasionally.

Larvae of *A. aloponotum* were collected from March to mid-June in these two areas. They were found in the grassy edges of a small, shallow-water lake at an elevation of 3,500 feet a few miles east of Idanha and in a marshy herbaceous or peat-covered area at an elevation 3,800 feet in Linn County about 10 miles south of Marion Forks. Both habitats are contiguous to State Highway 22 but are otherwise completely surrounded by the dense forest that is characteristic of this particular stretch of the western slope of the Oregon Cascades. From November until spring, both areas are normally covered with about 9 feet of snow.

[1] We wish to thank Pamela Harr of this laboratory for assisting in some phases of this study.

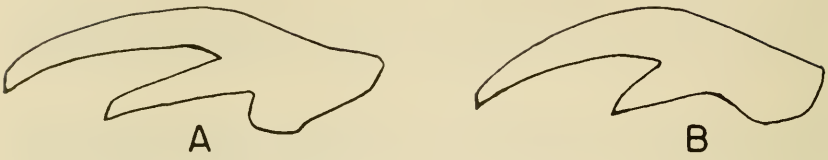

Fig. 1. Tarsal claw: A, *Aedes excrucians* Walker; B, *A. aloponotum* Dyar.

Adult and matching larval skins were obtained from the larvae collected. The females had the typical claw of *A. aloponotum* (fig. 1) except for slight variations in a few of the 50 specimens. Also, the mesonotum of each female was reddish-brown, was scaled with some white scales in the prescutellar area, and usually had some white scales around the lateral margins. Occasionally, some specimens also had small spots of white scales higher up on the posterior area of the mesonotum.

All 50 4th-instar larvae from the two areas had double lateral abdominal hairs on the 1st to the 5th segments; in 44, the hairs were also double on the 6th segment. In 90 percent of 40 larvae of *A. aloponotum*, the subapical spines of the comb scale extended from one-half to three-quarters the length of the central spines. In contrast, 22 larvae of *A. excrucians* (Walker) from Idaho and Washington that were examined had the subapical spines of the comb scales extended one-half or less the length of the central spine. (Only the scales from the central area of the comb were studied because much less variation occurs in the shape of the scales in this area.)

Larvae of *A. aloponotum* and *A. fitchii*, which often occur together are difficult to separate when detached teeth are present on the larvae of *A. fitchii*. However, we found that mesothoracic hairs 1 and 2 of these species will readily separate them. A key for the larvae of these species is given below:

1. Mesothoracic hair 1, 15 times as long as mesothoracic hair 2 ..... **fitchii**
   Mesothoracic hair 1, two to three times as long as mesothoracic hair 2 2
2. Lateral abdominal hairs, double on segments 1 to 6 or occasionally single on 6 ..... **aloponotum**
   Lateral abdominal hairs, double on segments 1 and 2 and single on 3 to 6 ..... **excrucians**

We have collected *A. aloponotum* in the following locations on the indicated dates.

Oregon—Idanha 5/12/64; Marion Forks 7/7/65; Odell Lake 6/28/41; Suttle Lake 7/19/32; Oswego Lake 7/7/35. Washington—Port Madison 4/27/34; Twin Buttes 6/27/35; Newport 4/26/63; Port Angeles 5/9/61; Everson 5/9/45; Greenwater 6/24/44; Bellingham 5/9/45; McKenna 4/18/61. Also from Wash-

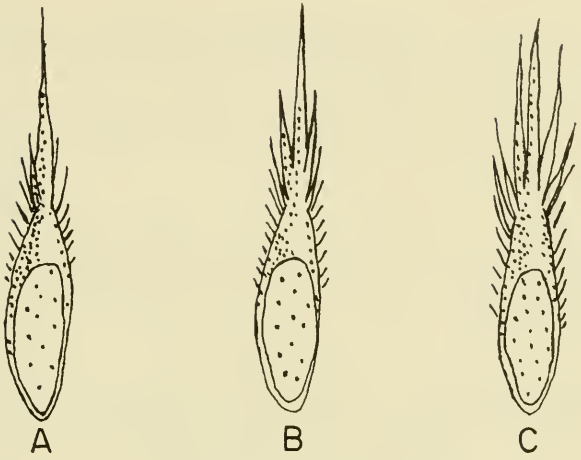

Fig. 2. Location, number of specimens (in parentheses), and type of comb scales occurring on larvae of *Aedes communis* (DeGeer) from: Clifdell, Wash. (4) B & C; Park Rapids, Wash. (6) B & C; Lost Lake, Ore. (2) A, B, & C; Kendrick, Ida. (11) A, B, & C; Smith Ferry, Ida. (3) A only; Chemult, Ore. (43) A, B, & C.

ington, we have records by Boddy (1948) from Seattle, Hoodsport, Lake Cushman, Ashford, Mt. Vernon, and Custer.

Aedes communis (DeGeer)—Comb scales differing in shape from those commonly described for the larvae of the species were found by Chapman and Barr (1964) in three western states. These specimens were described as the subspecies *nevadensis* by these authors. They found that the larvae they examined from Oregon and Washington were similar to *nevadensis* but differed in the arrangement of the spinules.

The range in the number of comb scales and the variations in the length of the spinules in relation to the central spine for six larval collections from three different states are reported here. A total of 75 fourth-instar larvae were examined.

The head hairs of all the larvae were single. The number of comb scales ranged from 26 to 70, and the average number was 51. Variations in the length of the spinules in relation to the central spine have been tabulated and are shown in figure 2. Although the spinules were mostly of the three lengths shown, some intergrades suggest that all lengths may be present in larger samples of larvae from some locations.

The examination of this limited group of larvae from these three states indicates that the larval comb scales in most populations of this species in the area are probably of the types shown in figure 2. However, examinations of more extensive collections may reveal other types that differ.

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AUTHORSHIP OF PACHYDIPLOSIS ORYZAE, A RICE PEST OF ASIA AND AFRICA

(Diptera: Cecidomyiidae)

Authorship of *Pachydiplosis oryzae* has usually been credited to Wood-Mason (1881, *in* Riley, Amer. Natur. 15:149), *e.g.* by Rao (1955, Agra Univ. J. Res. 4:270) and Harris (1966, Trans. R. Ent. Soc. Lond. 118:349). However, Barnes (1956, Gall Midges of Economic Importance, VII:204, Crosby Lockwood and Son, Ltd., London) credited the name to Mani (1934, Rec. Indian Mus. 36:433).

In 1880, according to Cotes (1889, Indian Mus. Notes 1: 103), correspondence by Wood-Mason, in the Supplement to the Calcutta Gazette, discussed a fly apparently new to science called *Cecidomyia oryzae,* which was injuring the rice crop in India. There was apparently no description included, nor would one printed in a newspaper be valid. Those crediting authorship of this species to Wood-Mason date it from 1881 in an article by Riley (*op. cit.*). I quote the pertinent information in full: "In this connection we would finally call attention to the reported recent appearance of a formidable insect enemy to the rice plant in the East Indies. Mr. Wood Mason, deputy superintendent of the India Museum has identified it as belonging to the genus *Cecidomyia,* which genus 'has never before been found in India,' and proposes the name of *C. oryzae,* for the species, which threatens to become very destructive to the rice crop." The above statement does not contain the requirements for a species description; the name *C. oryzae* is a *nomen nudum.*

Cotes (*op. cit.*) does not give a description either, but he includes figures, which he ascribes to Wood-Mason, of the pupa and wing of *C. oryzae.* The figures labelled *Cecidomyia oryzae* do constitute an indication; therefore, Wood-Mason should still be considered the author, but authorship dates from 1889, not 1881.

Felt (1921, Mem. Dept. Agr. India 7:16) transferred the species to *Pachydiplosis,* and Mani (*op. cit.*) was the first to describe it formally. Earlier valid descriptions, however, were given by Wood-Mason in Cotes (*op. cit.*), by Ghosh (1917, Proc. 2nd Ent. Mtg., Pusa, p. 196), and by Nguyễn-còng-Tièu (1922, Bull. Econ. Indochina 25:590–593, 1 pl.).

The full citation of the species in question, then, should read, *Pachydiplosis oryzae* (Wood-Mason), 1889.—Raymond J. Gagné, *Systematic Entomology Laboratory, U. S. Department of Agriculture, Washington, D. C. 20560.*

NEOTROPICAL COCKROACHES OF THE GENUS XESTOBLATTA: A NEW SPECIES FROM COSTA RICA AND NOTES ON OTHER SPECIES

(DICTYOPTERA: BLATTARIA: BLATTELLIDAE)

FRANK W. FISK *and* ASHLEY B. GURNEY[1]

This is the first of several studies of cockroach systematics that had their original incentive in collections made by one of us (Fisk) in Costa Rica; material from other collectors and consultation with leading reference collections have enabled us to broaden the review associated with new species which have been found. The present study includes the description of a new Costa Rican species of *Xestoblatta* that is particularly interesting because of its close relationship to *X. buscki* Gurney. The two species differ especially in the degree of development of the specialized glandular area of the male abdomen. In *buscki*, an oval area is lightly outlined on tergum 7 (fig. 4), but in the new species it is fully developed as a deep pitlike organ. Males of many of the species in this genus possess remarkable abdominal specializations of a glandular type that are attractive to females during mating. Therefore, the occurrence of two species that are so similar except in the extent of dorsal specialization is significant because of current interest in modifications related to mating behavior and also because the specialization probably reflects evolutionary development in closely related species.

As an aid to other students, we have followed the description of the new species with a list of other species of *Xestoblatta* that have been described since the genus was revised by Gurney (1939) and have also appended a list of references to species mentioned in the literature since 1939. To save space, only citations of these references, rather than the full titles, are given.

Xestoblatta cantralli, n. sp.
(Figs. 2, 3, 5–8, 10, 13)

Male (holotype).—Turrialba, Costa Rica. May 28, 1951 (O. L. Cartwright) (USNM 69699).

Size medium for group; tegmina well developed, extending nearly to apices of cerci. Interocular space with lateral margins nearly parallel; width at vertex 0.8 mm, slightly narrower than distance between ocellar spots. Ulnar vein (Cubitus) of wing with 3 rami reaching margin, 2 short incomplete rami going to anal vein (based on paratype from La Lola since holotype has indistinct wing venation). Sixth abdominal tergum weakly, broadly emarginate along caudal

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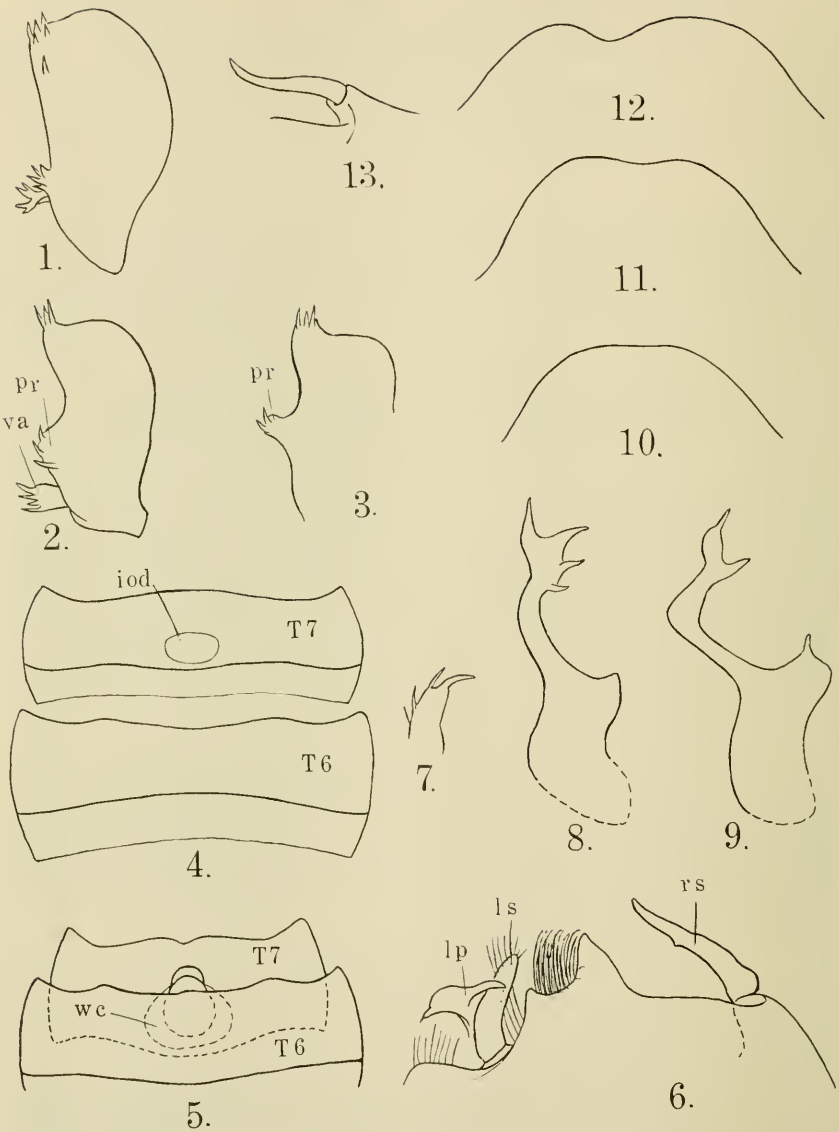

Figs. 1, 4, 9, 11, 12, *Xestoblatta buscki* Gurney: 1, ♂ paratype, Barro Colorado Is., right paraproct, dorsal view, KOH prep.; 4, ♂ paratype, Barro Colorado Is., abdominal terga 6 & 7, dorsal view, KOH prep.; 9, ♂ paratype, Barro Colorado Is., 2nd sclerite of right phallomere, dorsal view, KOH prep.; 11, ♂ (in alcohol), Tilaran, C. R., posterior margin of supra-anal plate, ventral view, KOH prep.; 12, ♂ paratype, Barro Colorado Is., same as 11. Figs. 2, 3, 5–8, 10, 13, *X. cantralli*, n. sp.: 2, holotype, right paraproct, dorsal view, KOH prep.; 3, ♂ paratype, La Lola, C. R., posterior portion of right paraproct, dorsal view, dry specimen; 5, holotype, terga 6 & 7, dorsal view, KOH prep.; 6, holotype,

margin; latter overlaps, partially covers pit opening on tergum 7. Seventh tergum bears deep median pit that enlarges just beneath opening so that diameter of cavity is greater than that of entrance pore, larger internal wall or collar of pit (fig. 5 *wc*) evident; caudal margin of tergum 7 narrowly emarginate medially, lateral angles produced. Eighth tergum nearly concealed; posterior margin of broadly rounded supra-anal plate with slight suggestion of emargination at apex (fig. 10). Subgenital plate in ventral view as in fig. 6; left paraproct (*lp*) bears slender curved spiniform process ending in single sharp point; left stylus gently curved medially near apex, blunt at apex; posterior margin of subgenital plate with asymmetrical, strongly sclerotized, furcate projection between styli, its right branch the larger; 2 tufts of strong setae, 1 composed of setae closely grouped together and with straight tips, the other group arranged in a dense row with their tips hooked, project from near left paraproct and appear just dorsad of furcate projection of subgenital plate; right paraproct specialized in the form of mitten-shaped plate with armed ventral appendage (fig. 2, *va*) projecting from beneath posterior margin. Hooklike second sclerite of right phallomere (R_2 of McKittrick, 1964) as in fig. 8.

Coloration.—Pronotum with pale yellow lateral and anterior margins grading into mottled brown disk. Tegmen cinnamon brown, slightly paler along costal margin, with transparent yellow in marginal field; shiny, with faint metallic luster. Wing transparent, brownish buff with noticeable blackish tinge anteriorly from branched axillary vein; costal margin grading into light tan. Face pale buff; interocular space brown, paling toward occiput; brown band between antennal sockets, fading at extremities; clypeus tan; labrum brown; distal segment of maxillary palpus pale brown, other segments and labial palpi pale, off-white. Legs pale, with brown at bases of spines; each coxa with 2 brownish-black spots in area that receives femur in repose, 1 near base, other near apex, the distal spot paler. Ventral surface of abdomen pale along lateral margins, darker medially and toward apex, distinctive blackish spots at laterocephalic angles of sterna 2–7 (corresponding to locations of spiracles). Subgenital plate brown, with pale margins except for posterior forked projection, which like right stylus, is heavily sclerotized, deep brown. Cerci deep brown ventrally and laterally, pale dorsally.

Measurements (in millimeters).—Length of body, 17.0; of pronotum, 3.6; of tegmen, 15.0; of hind tibia, 6.5; width of pronotum, 5.1.

Female (allotype).—La Lola (0.5 mi. w. of Madre de Dios), Limón Prov., Costa Rica. Oct. 2, 1961 (T. H. Hubbell, I. J. Cantrall, and T. J. Cohn) (University of Michigan, Museum of Zoology).

General form as in male. Interocular space with lateral margins parallel, 0.8

←

subgenital plate and appendages, ventral view, KOH prep.; 7, paratype, La Lola, C. R., apical portion of left paraproct, ventral view, dry specimen; 8, holotype, 2nd sclerite of right phallomere, dorsal view, KOH prep.; 10, holotype, posterior margin of supra-anal plate, ventral view, KOH prep.; 13, ♂ paratype, La Lola, C. R., right stylus and attachment to subgenital plate, ventral view, dry specimen. Abbreviations: *iod*, faintly impressed oval depression of specialized area; *lp*, left paraproct; *ls*, left stylus; *pr*, projection from posterior margin of right paraproct; *rs*, right stylus; *T6*, tergum 6; *T7*, tergum 7; *va*, ventral appendage of right paraproct; *wc*, wider internal "collar" of specialized pit. Drawings by A.B.G.

mm wide; ocellar spots conspicuous, white. Abdomen somewhat stout. Tegmina surpassing apices of cerci; wing with 4 complete and 1 incomplete rami of ulnar vein. Abdomen with terga unspecialized, broadly rounded at apex.

Coloration.—Essentially as in male. Dark bands across distal portions of abdominal terga and lateral dark spots on sterna somewhat more pronounced than in male. Subgenital plate dark brown centrally, grading into yellow on lateral margins. Median proximal portion of plate bears a lighter brown triangular spot with its apex directed posteriorly.

Measurements (in millimeters).—Length of body, 19.3; of pronotum, 4.5; of tegmen, 17.1; of hind tibia, 7.4. Width of pronotum, 5.7.

Variation.—One of the dry pinned male paratypes has the right stylus more smoothly curved, without any indication of serrations on the shaft, also with the base exserted from the posterior margin of the subgenital plate, unlike the condition in the relaxed and KOH-treated preparation from the holotype. The "thumb," that is, the projection from the posterior margin of the dorsal surface of the right paraproct (figs. 2, 3, *pr*), is more developed in some males than others, and the ventral appendage (*va*), though present, is largely concealed in some specimens due to the position of the genital parts. The left paraproct of the holotype (fig. 6, *lp*) is short, though with a more complex apical part in some paratypes (fig. 7), but it is not as slender as in *buscki*. In some paratypes the folded tegmina briefly surpass the apices of cerci. There is moderate variation in body size, and 1 of the largest male paratypes has the following measurements: length of body, 19.5 mm; of pronotum, 4.3; of tegmen, 18.3; of hind tibia, 8.0; width of pronotum, 5.7.

Specimens examined: 19 (Holotype, allotype, 11 ♂, 6 ♀ paratypes). Paratypes as follows (all Costa Rica): La Lola (0.5 mi. w. of Madre de Dios), Limón Prov., Oct. 2, 1961 (Hubbell, Cantrall, and Cohn), 5 ♂♂, 5 ♀♀; Los Diamantes (1 km. e. of Guápiles), Limón Prov., Jan. 27, 1967 (I. J. Cantrall), 4 ♂♂; Puerto Limón, July 7, 1966 (T. H. Hubbell), 1 ♂, 1 ♀; La Selva (Holdridge Estate), Heredia Prov., Nov. 13, 1964 (T. H. Hubbell), 1 ♂. (Paratypes deposited at Museum of Zoology, University of Michigan, at Department of Entomology, Ohio State University, and at U. S. National Museum).

We are glad to name this species in honor of our friend Irving J. Cantrall, the University of Michigan, one of the collectors, as a tribute to his consistent success in collecting Orthoptera, and to his notable curatorial accomplishments in the development of the Orthoptera collection at Michigan from which we have been privileged to borrow for study most of the specimens of this interesting new species.

In addition to the interesting distinction between *buscki* and *cantralli* with respect to tergal specialization, the following differences, all in male genitalia, occur. (Figs. 36, 42, 69 of Gurney, 1939, show genitalia of *buscki*):

1. Right stylus broadly curved near base in *buscki*, not so in *cantralli*.
2. Furcate median projection of posterior margin of subgenital plate with point on right side proportionally longer in *cantralli*.

3. Right paraproct with posterior margin more emarginate in *cantralli*, giving more of mittenlike appearance (compare with *buscki*, fig. 1).

4. Left paraproct more elongate in *buscki*.

5. Hook-shaped sclerite (R_2) of right phallomere (figs. 8, 9) differs in detail in the two species.

The weak development of tergal specialization in *buscki* was overlooked when *buscki* was originally described, an illustration of the way the less conspicuous tergal specialization of cockroaches has often been unnoticed.

Certain variation in *buscki* was noted with the original description. Also some variation in the posterior margin of the supra-anal plate occurs. Dry specimens of *buscki* show scarcely any emargination of that margin. One paratype (fig. 12) from which a KOH preparation has been made is emarginate and somewhat asymmetrical. A Costa Rican male, not previously reported and preserved in alcohol, has the margin weakly emarginate (fig. 11). Dry specimens at hand show scarcely any emargination.

New Species of **Xestoblatta** Described Since 1939

X. amaparica R.-S. Albuquerque and Gurney, 1962, Studia Ent. 5:250, figs. 30–35. From Territory of Amapá, Brazil.

X. bananae R.-S. Albuquerque, 1962, Proc. Ent. Soc. Wash. 64:244, figs. 6–11. From Ecuador.

X. iani R.-S. Albuquerque, 1964, Rev. Brazil. Biol. 24(1):11, figs. 1–8. From Belém, Brazil.

X. surinamensis Bruijning, 1959, Studies Fauna Suriname and other Guyanas (Uitgaven Nat. Studiek. Suriname Nederlandse Antillen, 18) 2:74, figs. 22–23. From Tibiti savanna, Surinam.

X. tingomariensis R.-S. Albuquerque, 1962, Proc. Ent. Soc. Wash. 64:114–116, figs. 1–5. From Tingo Maria, Peru.

References to Previously Described Species of **Xestoblatta** Published Since 1939

X. amaparica R.-S. Albuquerque and Gurney. R.-S. Albuquerque. 1964. Bol. Mus. Paraense Emilio Goeldi 41:28 (Brazil list); R.-S. Albuquerque. 1964. *Ibid.* 45:17 (Venezuela).

X. braziliae Gurney. R.-S. Albuquerque. 1964. *Ibid.*, 41:29 (Brazil list).

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X. ecuadorana Gurney. Princis. 1941. Ark. Zool. 41(3):14 (Bolivia).

X. immaculata Hebard. R.-S. Albuquerque. 1964 Bol. Mus. Paraense Emilio Goeldi 41:29 (Brazil list).

X. micra Hebard. Princis. 1951. Spolia Zool. Mus. Hauniensis 12:45 (Brit. Guiana).

X. nyctiboroides (Rehn). Bruijning. 1959 Stud. Fauna Suriname, other Guy. 2:74 (Discussion).

X. para Hebard. R.-S. Albuquerque. 1964 Bol. Mus. Paraense Emilio Goeldi 41:29 (Brazil list).
X. ramona Gurney. R.-S. Albuquerque. 1964. *Ibid.* 41:29 (Brazil list).
X. surinamensis Bruijning. R.-S. Albuquerque. 1965. *Ibid.* 57:9 (Brazil).

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Gurney, A. B. 1939. A revision of the Neotropical genus *Xestoblatta* Hebard (Orthoptera; Blattidae; Pseudomopinae). Proc. Ent. Soc. Wash. 41:97–128, 73 figs.

McKittrick, F. A. 1964. Evolutionary studies of cockroaches. Cornell Univ. Agr. Exp. Sta. Mem. 389, 197 pp., 205 figs., 6 text-figs.

DIPTEROUS EGGS AS FOOD FOR ADULT COCCINELLIDAE
(Coleoptera: Coccinellidae)

During the summer of 1967 it was observed that numerous adult Coccinellidae, primarily the convergent lady beetle (*Hippodamia convergens* Guérin-Méneville), were feeding on aphids (species not identified) on black locust trees (*Robina Pseudo-Acacia* L.) adjacent to a parking lot in west Baltimore, Maryland. Approximately one hundred of these were collected and placed in an aluminum frame and screen cage, measuring 1 ft^3. The beetles were maintained in the laboratory at a temperature of 75°F ± 2°F. Water was provided by soaking absorbent cotton in a small petri dish and placing it on the floor of the cage.

After two days without food the beetles were offered the eggs of a mosquito, *Aedes aegypti* (L.). These eggs had previously been deposited on paper toweling. The beetles fed on the *Aedes* eggs readily and over night the paper toweling was completely cleared of several thousand mosquito eggs. *Aedes* eggs were provided daily for seven days. During this time the beetles remained active and in apparent good health. After seven days of feeding on mosquito eggs the food was changed to eggs of *Musca domestica* L. an approximate one-half teaspoon being placed in the cage daily. The beetles were maintained for a period of ten days on this latter food. Unfortunately, the pressure of other duties precluded further observation and the colony was released.

Observations made during daily feedings revealed copulating pairs on several occasions. There were, however, no eggs deposited by the beetles during the period of observation. The mortality over the twenty day period was approximately ten percent.

These observations may be of general interest, and further, might encourage a study of other possible foods that may be useful for rearing complete cycles, or providing economical means of rearing colonies of these highly beneficial insects.—James W. Gentry *and* Eugene J. Gerberg, *Insect Control & Research, Inc., 1111 N. Rolling Road, Baltimore, Maryland 21228.*

RHINOECIUS CAVANNUS, A NEW SPECIES OF NASAL MITE FROM A THAILAND OWL

(MESOSTIGMATA: RHINONYSSIDAE)[1]

NIXON WILSON, *B. P. Bishop Museum, Honolulu, Hawaii 96819*

The rhinonyssid genus *Rhinoecius* Cooreman as presently known is restricted to the avian order Strigiformes. Only seven species of mites have been described from an order that contains approximately 29 genera and 142 species of owls. No doubt many species of *Rhinoecius* remain to be discovered.

The description of an additional species and record of another species from Thailand follows. The material was received from Dr. D. J. Gould of the SEATO Medical Research Laboratory and from Dr. H. E. McClure of the Migratory Animal Pathological Survey, both of Bangkok, Thailand.

The new species is deposited in the Bishop Museum with remaining material divided between the Bishop Museum and the SEATO Laboratory. Host nomenclature follows Deignan (1963).

Rhinoecius bisetosus Strandtmann

Rhinoecius bisetosus Strandtmann, 1952, Proc. Ent. Soc. Wash. 54(4):212. Thailand: 2 ♀♀, from *Glaucidium cuculoides* (Vigors) (SMRL 1748), Huai Mae Sanam, Hod, Chiengmai (N 18°10′, E 98°20′), 915–1070 m, 6 November 1962.

Our material showed the same variation as was listed by Strandtmann (1960) for specimens from Thailand.

Rhinoecius cavannus, n. sp.

(Fig.1)

Diagnosis. A medium sized mite with podosomal plate slightly longer than wide, widest in posterior half, with 2 pairs of setae and 1 pair of setal bases; opisthosomal and pygidial plates divided vertically; sternal plate small and very poorly developed; 3 anal setae; gnathosomal setae absent.

Description

Female. *Body*: Length of idiosoma 635 μ, width 470 μ; all dorsal and ventral setae simple. *Dorsum*: Podosomal plate 253 μ long, 239 μ wide, widest in posterior half, margins irregular, with 2 pairs of setae and 1 pair of setal bases—1 pair of setae lateral, opposite widest part of plate, 1 pair on posterior margin, 1 pair of setal bases on anterolateral margin, 1 median and about 8 lateral areas of muscle attachment poorly distinguished, 2 pairs of platelets anterolateral to podosomal plate—1 pair very close to podosomal plate with pair of pores, 1 pair poorly developed and midway between podosomal plate and lateral margin of idiosoma, opisthosomal plate reduced to anterior portion and divided vertically,

[1] This investigation was supported by U. S. Public Health Service Research Grants AI-1723 and 07576 from NIAID.

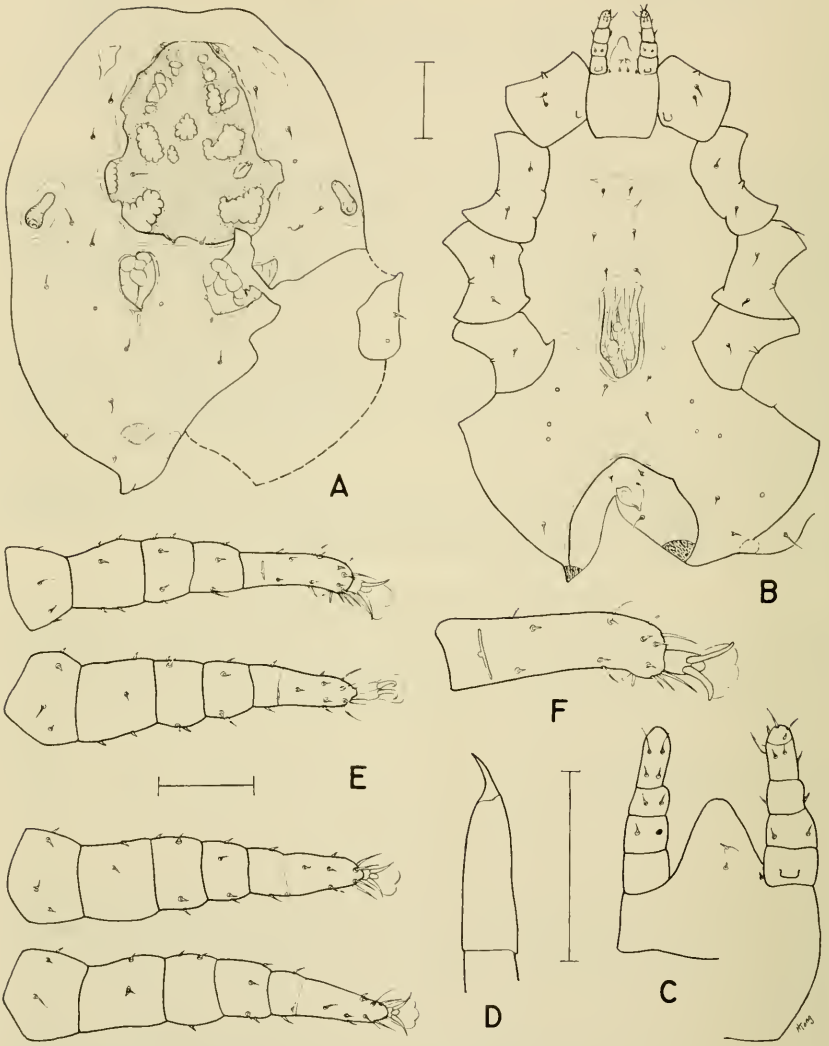

Fig. I, *Rhinoecius cavannus* n. sp., holotype female: A, dorsal view; B, ventral view; C, gnathosoma, dorsal (left) and ventral (right) views; D, chelicera; E, legs I to IV, ventral view; F, enlarged ventral view of tarsus I. Scale equals 100 μ.

76 μ long, 55 μ wide, with irregular margins, several minute platelets extend from posterior margin, weakly indicated area of muscle attachment covers most of each plate; pygidial plate divided vertically, 28 μ long, 44 μ wide, opisthosomal and pygidial plates without setae and pores; integument with 8 pairs of setae—2 pairs lateral to podosomal plate, 2 pairs between peritremes and

Table 1. Leg chaetotaxy of *Rhinoecius cavannus* n. sp.

Segment	Leg I	Leg II	Leg III	Leg IV
Coxa	$0\frac{0}{2}0$	$0\frac{0}{2}0$	$0\frac{0}{2}0$	$0\frac{0}{1}0$
Trochanter	$1\frac{0}{2}1$	$1\frac{0}{3}0$	$1\frac{0}{3}0$	$1\frac{0}{2}0$
Femur	$2\frac{4}{1}2$	$1\frac{4}{1}2$	$1\frac{3}{1}0$	$1\frac{3}{1}0$
Genu	$2\frac{4}{2}1(2)$	$1\frac{4}{2}1$	$1\frac{4}{2}1$	$1\frac{4}{1}1$
Tibia	$1\frac{3}{2}1$	$1\frac{3}{2}1$	$1\frac{3}{2}1$	$1\frac{3}{2}1$
Tarsus	22	$3\frac{5}{5}3$	$3\frac{5}{5}3$	$3\frac{5}{5}3$

opisthosomal and podosomal plates, 1 pair posterior to peritremes and lateral to opisthosomal plates, 2 pairs between opisthosomal and pygidial plates, 1 pair posterolateral to pygidial plates, 4 pairs of pores—1 pair opposite widest portion of podosomal plate, 1 pair between divided opisthosomal plates (1 attached to plate), 1 pair opposite outer margins of opisthosomal plates, 1 pair on posterolateral margin of idiosoma; peritreme including stigma 46 μ long, above coxa III, stigma 18 μ wide, enclosed in shieldlet. *Venter*: Tritosternum absent; sternal plate very poorly developed, represented by several non-striated areas anterior to first pair and between first and second pairs of sternal setae, 3 pairs of sternal setae, distance between first and second pair slightly greater than distance between second and third pair, second pair farther apart than first and third pair, no sternal pores; genital plate 145 μ long, 51 μ wide, anterior margin reaching almost to level of third pair of sternal setae, sides subparallel, posterior margin broadly rounded, with about 3 poorly defined areas of muscle attachment, 1 pair of setae and pores posterolateral and lateral to genital plate, respectively; anal plate 154 μ long, approximately 122 μ wide, posterior and posterolateral margins thickened, cribrum present, anal pore in anterior half of plate, paranal setae anterior to anal pore, postanal seta immediately posterior to anal pore, all anal setae about 23 μ long; opisthosoma with 3 setae—1 about midway between genital and anal plates, 1 pair opposite lateral margins of anal plate, 3 pairs of pores posterior to coxae IV. *Gnathosoma*: No deutosternal groove or gnathosomal setae; 3 pairs of short pointed hypostomal setae; palpal trochanter without setae, femur with 1 seta (2 setae on one side) and 1 sensory area dorsally and 2 setae ventrally, genu with 2 setae dorsally and ventrally, tibia with 4 setae dorsally, 2 longer than any on palps, 4 setae ventrally, 1 on inner margin, long and stout, tarsus with 4 setae, 2 short and 2 long; chelicera 133 μ long, 28 μ wide, chela 25 μ long, shape typical for genus. *Legs*: Length of tarsus I 115 μ, II 110 μ, III 122 μ, and IV 127 μ, most setae

short and simple, a few on tarsus and dorsum long, chaetotaxy indicated in Table 1, tarsal claws II to IV better developed than I.

Holotype female (BISHOP 7616), from *Otus bakkamoena* Pennant (MAPS H 0907), Thailand, Chiengmai, Doi Inthanon, 2 November 1964, J. T. Marshall (JTM 5904).

The new species is similar to *Rhinoecius grandis* Strandtmann, 1952, described from the United States and since reported from Brazil (Amaral, 1962). *R. cavannus* n. sp. has a different shaped podosomal plate with two pairs of setae and one pair of setal bases, and a pygidial plate. In addition, the platelets, setae, and pores on the idiosoma differ in number and position. Ventrally, the pair of gnathosomal setae is absent, the palpal trochanter lacks setae, and the sternal plate is much smaller and more poorly developed. In *R. grandis* there is one pair of setae on the podosomal plate and the pygidial plate is missing. Also the gnathosomal setae are present and the palpal trochanter has one ventral seta.

Rhinoecius are thick mites and it is difficult to get mounted specimens in which you can see the important taxonomic characters and still not have the mite damaged. This is the case with the unique holotype which has the anal plate and the right posterolateral aspect of the dorsum damaged. In addition, five tarsi are broken, but not entirely separated from the tibiae. This damage does not obscure any characters important for distinguishing the species.

HOST AND LOCALITY LIST OF **Rhinoecius** FROM STRIGIFORMES

Species Host	Locality
1. *africanus* Zumpt and Patterson	
Asio capensis (A. Smith)	South Africa
2. *bisetosus* Strandtmann	
Glaucidium cuculoides (Vigors)	Thailand
Glaucidium cuculoides bruegeli (Parrot)	Thailand
Speotyto cunicularia (Molina)	United States
Speotyto cunicularia grallaria (Temminck)	Brazil
3. *cavannus* n. sp.	
Otus bakkamoena Pennant	Thailand
4. *cooremani* Strandtmann	
Strix varia Barton	United States
5. *grandis* Strandtmann	
Bubo virginianus (Gmelin)	United States
Pulsatrix melanota koeniswaldiana (Bertoni and Bertoni)	Brazil
6. *oti* Cooreman	
Asio otus otus (Linnaeus)	Belgium
7. *subbisetosus* Bregetova	
Athene noctua (Scopoli)	Russia

8. *tytonis* Fain

Tyto alba (Scopoli)	South Africa
Tyto alba affinis (Blyth)	Rwanda

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PARATOXURINAE, A NEW SUBFAMILY NAME IN THE PYRGOTIDAE (DIPTERA)

In the revision of Neotropical Pyrgotidae by Aczél (1956), the genus *Descoleia* Aczél was placed in the Toxurinae, a subfamily founded by Malloch (1929) as tribe Toxurinii (sic) and derived from the generic name *Toxura* Macquart. Paramonov (1958: 110–111) has shown that Malloch misidentified *Toxura maculipennis* Macquart and has renamed the species Malloch had before him, placing it in the new genus *Paratoxura* Paramonov. According to Paramonov, the true *Toxura* is a genus of Tephritidae.

Consequently, the group taxon based upon the misidentified *Toxura* will also need a new name. Paramonov did not use a subfamily classification in his work, beyond citing "Lochmostylinae" with reference to an extra-Australian genus. In my catalogue of neotropical Pyrgotidae (Steyskal, 1967: 2), I placed *Descoleia* in the subfamily Paratoxurinae. Inasmuch as the Code requires a diagnosis of new taxa, that is furnished here: PARATOXURINAE, new subfamily based upon the genus *Paratoxura* Paramonov, 1958: 110—Pyrgotidae with setiform, microscopically pubescent arista; well developed mouthparts; apex of wing vein *Sc* turned sharply costad; 2nd antennal segment with deep laterodorsal cleft; as treated by Aczél (1956) under the name Toxurinae and by Malloch (1929) under the name Toxurinii. Literature cited: Aczél, M. 1956. Revisión parcial de las Pyrgotidae, etc. Rev. Brasil. Ent. 4:161–184, 5:1–70, 6:1–38; Malloch, J. R. 1929. *In* Bezzi, M., Australian Pyrgotidae (Diptera). Proc. Linn. Soc. New So. Wales 54:1–31; Paramonov, S. J. 1958. A review of Australian Pyrgotidae (Diptera). Austral. Jour. Zool. 6:89–138; Steyskal, G. C. 1967. Family Pyrgotidae. *In* Dept. Zool. Secr. Agric., São Paulo, A catalogue of the Diptera of the Americas south of the United States, fam. 56:1–8.—GEORGE C. STEYSKAL, *Systematic Entomology Laboratory, U. S. Department of Agriculture, c/o U. S. National Museum, Washington, D. C. 20560.*

LARVA OF MICROCHRYSA FLAVICORNIS (MEIGEN) WITH A KEY TO LARVAE OF MICROCHRYSA OCCURRING IN AMERICA NORTH OF MEXICO

(DIPTERA: STRATIOMYIDAE)

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I recently had an opportunity to examine specimens of adult Stratiomyidae from the Canadian National Collection and was quite fortunate in finding a specimen of *Microchrysa flavicornis* (Meigen) with its associated puparium (last larval skin) that had incorrectly been identified as *Microchrysa polita* (L.).

This is the first time that an immature stage of this species has been described; it completes the information needed to develop a key that can be used to distinguish between the larvae of the two species of *Microchrysa* that occur in North America.

Microchrysa flavicornis (Meigen), 1822
(Figs. 1–3)

Description.—Puparium: length—5.5 mm (head capsule separated from body); width—2 mm; width of head at eye prominence 0.50 mm; width of head at neck 0.48 mm; mean ratio of width of head at eye prominence to width at neck 1.04; venter of sixth abdominal segment with setae on each side of the sternal patch equal in length to other setae on that segment; anal spines lacking.

Biology.—A single larva of this species was found beneath dung in woods.

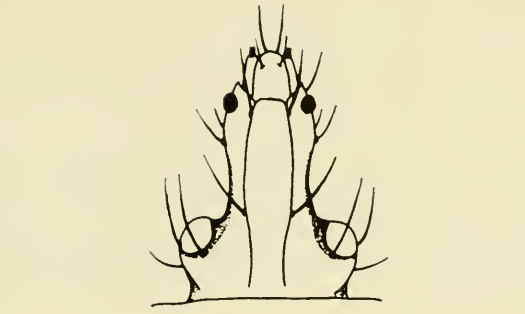
Material examined.—One puparium from the Canadian National Collection with the following data: Marmora, Ontario, 10.VII. 1952, J. R. Vockeroth.

Discussion.—The larva of *M. flavicornis* is quite similar to that of *M. polita;* the following differences were noted: the neck region of *M. flavicornis* is not as constricted as is that of *M. polita,* the chaetotaxy is somewhat different, and the head of *M. flavicornis* has several darkly pigmented structures that appear to be lacking in *M. polita.* For a complete discription of *M. polita* see McFadden (1967.)

KEY TO LARVAE OF **Microchrysa** LOEW OCCURRING IN AMERICA NORTH OF MEXICO

For a generic description of Microchrysa see my earlier paper (McFadden 1967).

1. Body and head of larva uniformly testaceous; setae on each side of sternal patch on venter of sixth segment reduced in size; ratio of width of head at eye prominence to width at neck 1.32 ..... **M. polita** (L.)
   Body of larva uniformly testaceous, head with antennae and maxillary palpi black; setae on each side of sternal patch equal in length to other setae



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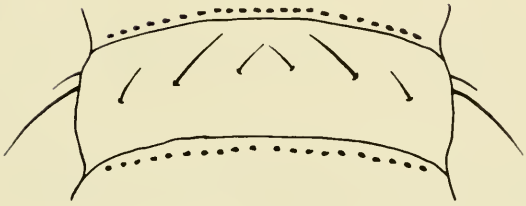

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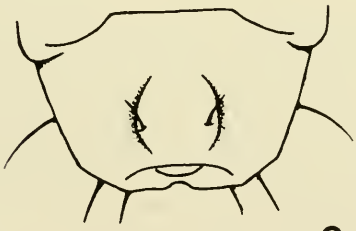

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Figs. 1–3, Puparium of *Microchrysa flavicornis* (Meigen): 1, head capsule, dorsal view; 2, first abdominal segment, dorsal view; 3, apical abdominal segment, dorsal view.

in transverse row; ratio of width of head at eye prominence to width of head at neck 1.04 ..... **M. flavicornis** (Meigen)

I would like to thank Dr. B. V. Peterson, Entomological Research Institute, Ottawa, Canada, for allowing me to examine these specimens.

Reference

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THREE NEW SPECIES OF BLISSUS FROM THE ANTILLES
(HETEROPTERA: LYGAEIDAE)

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In a study of the fauna of eastern North America of the genus *Blissus* Burmeister (Leonard, 1966, 1968) it was noted that the paratype of *B. insularis* Barber 1918 were not conspecific with the holotype of *insularis* from Florida. This paper describes these specimens from Puerto Rico as a new species, and also includes two other new species.

The New World forms of the genus *Blissus* are generally accepted to be of South or Central American origin, but little work has been done on the fauna of this region. In fact, at present about twice as many species of *Blissus* are known from eastern North America as have been described from Central and South America. Until the fauna from Central and South America is better understood, there will most likely not be an exhaustive study of the insular fauna.

The generalized facies of the genus *Blissus* appear in Leonard (1968) and will not be repeated here. All measurements are in mm.

Blissus slateri, n. sp.

Head gray pruinose dorsally, tylus nearly piceous basally, becoming castaneous toward apex. Antennal segments I castaneous, II castaneous with apical ⅙ darker, segments III and IV dark, nearly piceous. Anterior lobe of pronotum gray pruinose except apical margin suffused with castaneous, posterior lobe velvety black except humeral angles suffused with castaneous and basal margin ochraceous. Scutellum velvety black. Hemelytra milky white, veins creamy white except light tan along commissure and membrane. Distal spot of hemelytra large, light brown. Membranous portion of wings opaque white, nearly reaching apex of abdomen.

Head nearly black ventrally and laterally, lightly covered with gray pruinose. Labium castaneous. Thoracic pleura gray pruinose, except light castaneous or ochraceous on propleural margins, apical margin of metapleuron, and bases of coxae. Apical margin of mesopleuron, and all but apical margin of metapleuron lightly shagreened, including ostiolar peritreme. Coxae dark castaneous, trochanters light castaneous. Prothoracic femora castaneous, except lighter on basal and apical margins, meso- and metathoracic femora light castaneous along both basal third and apical margin, slightly darker on apical half. Trochanters light castaneous, except darker on apical margin, most pronounced on prothoracic legs. First two tarsal segments light castaneous, last segment darker. Abdomen dark castaneous.

Head slightly declivent, impunctate, lightly clothed with erect and suberect straw-yellow setae, eyes prominent, antenniferous tubercles extending slightly downward from fore portion of eye, darkly castaneous, becoming light at apex.

Tylus prominent, nearly reaching apex of antennal segment I, width across eyes 0.67, interocular space 0.38, length of head 0.53. Length of antennal segments I–IV: 0.16, 0.38, 0.35, 0.58. Length of labial segments I–IV: 0.38, 0.48, 0.30, 0.34.

Metathoracic scent gland with anterior projection broadly oval, slightly wider than long, posterior margin not extending to lateral projection of scent gland. Pronotum clothed with erect and suberect light straw-yellow setae, lightly punctate, width of anterior lobe 0.99, width of posterior lobe 1.12, length along median 0.74. Posterior margin of pronotum slightly sinuate. Scutellum with erect straw-yellow setae, distinctly punctate except on lateral margin which is depressed along basal region, width 0.61, length 0.38. Length of hemelytra 1.28, total length of wing 2.18.

Abdomen densely clothed with closely appressed silvery-white setae, giving dark castaneous abdomen a silvery sheen. Length of abdomen and scutellum, 2.40; width of abdominal tergite V, 0.91. Total length, 3.42.

Females somewhat larger, same general characteristics as above. Width of head across eyes 0.62, interocular space 0.38, width anterior lobe of pronotum 0.96, posterior lobe 1.09, length 0.62. Length of scutellum 0.37, width 0.58. Length of abdomen and scutellum 2.34, width of abdominal tergite V 0.93. Total length 3.33.

Holotype: Male, San Juan, P. R. August 2 and 3, 1914. *Blissus leucopterus* var. *insularis* paratype H. G. Barber. USNM 69848.

Paratypes: 1 ♂ 4 ♀♀, same information as holotype; 15 ♂♂, 5 ♀♀, San Juan, P. R. August 2 and 3, 1914. AMNH, USNM, J. A. Slater's Collection, author's collection.

B. slateri is in the *leucopterus* complex. The distinguishing features of *slateri* are the contrasting coloration of the femora, lighter coloration of the veins and the distal spot, and the shape of the scent gland. Both macropters and brachypters are known. Of the specimens in the type series, 7 ♂♂ and 5 ♀♀ are brachypters.

It is my distinct pleasure to name this species after Dr. James A. Slater in respect for his immense contributions to the knowledge of the Lygaeidae, for his talents as an inspiring teacher, and in tribute for his nurturing of my interest in entomology.

Blissus planus, n. sp.

Head black, lightly tinged with gray pruinose, tylus piceous on basal ⅔, contrasting with light castaneous on apical ⅓. Antennal segment I and basal ¾ of II light castaneous, remainder of II and III-IV dark castaneous. Pronotum pruinose, except medially and apically velvety black, apical margin suffused with brownish-orange. Posterior lobe velvety black, becoming lighter basally, and basal margin conspicuously ochraceous. Scutellum velvety black. Hemelytra milky white, veins creamy white apically, light brown basally, bordering commissure, and membrane. Distal spot of corium large, light brown. Membrane opaque, white, reaching nearly to apex of the abdomen. Head nearly piceous ventrally, antenniferous tubercules piceous, bordering anterior margin of eye.

Labium castaneous. Propleuron generally black, lightly covered with gray pruinose. Apical margin and region bordering coxae ochraceous, basal ⅓ lightly suffused with orange, basal margin orange. Metapleuron lightly gray pruinose, basal margin shagreened. Coxal margins orange. Metapleuron shagreened, except dorsal and basal ⅓ lightly gray pruinose, basal margin ochraceous. Scent gland anterior projection not extending beyond margin of lateral projection. Legs similar, with coxae shining, dark castaneous, trochanters and femora castaneous. Abdomen castaneous, distal margin of V, VI, and VIII ochraceous.

Head lightly clothed with erect and suberect straw-yellow setae, tylus reaching apical margin of antennal segment I. Eyes prominent, width across eyes 0.59, interocular space 0.35, length of antennal segments I–IV: 0.14, 0.32, 0.26, 0.48. Length of labial segments I–IV: 0.35, 0.37, 0.26, 0.29.

Pronotum rather densely clothed with erect straw-yellow setae, basal margin slightly depressed. Lightly punctate except on margins and median. Width 0.56, length 0.32.

Hemelytra lightly clothed with erect straw-yellow setae, length 1.09. Total length of wings 1.89. Abdomen densely clothed with closely appressed and erect silvery-white setae. Length of abdomen and scutellum 1.95, width of abdominal tergite V 1.02. Total length 2.98.

Females somewhat larger, same general characteristics as above. Width of head across eyes 0.62, interocular space 0.35, length of antennal segments I–IV: 0.38, 0.43, 0.21, 0.32. Width of anterior lobe of pronotum 0.96, posterior lobe 1.14, length 0.67. Width of scutellum 0.61, length 0.35. Length of abdomen and scutellum 2.18. Width of abdomen 0.83. Hemelytral length 0.83, length of wing 2.08. Total length 3.20.

Holotype: Male, Mount Gay Est. (Leeward side), Grenada, W. I., H. H. Smith. USNM 69849.

Paratypes: 2 ♀♀, same data as holotype, P. R. Uhler Collection. 1 ♀, Caliveny Est. (Windward side), Grenada, W. I., H. H. Smith. In USNM and author's collection.

B. planus is in the *leucopterus* complex, and most closely approximates *Blissus leucopterus leucopterus* (Say). However, *B. planus* differs from *B. l. leucopterus* in its smaller size, lighter coloration of the abdomen and distal spot of the corium, and shorter antennae.

B. planus is known from both brachypters and macropters.

Blissus antillus, n. sp.

Head nearly black dorsally, lightly covered with light-gray pruinose, tylus piceous except apex dark castaneous. Antennal segment I castaneous, II light castaneous on basal ½, becoming dark castaneous, III-IV nearly piceous. Anterior lobe of pronotum gray, pruinose except apical and median velvety black. Posterior lobe velvety black. Apical and basal margin of pronotum lightly suffused with dusky orange. Scutellum velvety black. Hemelytra and membrane milky white. Veins of hemelytra milky white apically, becoming chocolate brown. Distal spot of corium chocolate brown.

Head and thorax nearly black ventrally and laterally, lightly suffused with

gray pruinosity. Apical and basal margin of propleuron, apical margin of metapleuron, and margins of coxae lightly yellowed or oranged. Basal margin of mesopleuron and apical ⅔ of metapleuron including scent gland shagreened, except region above the prominent metapleural groove. Coxae dark castaneous, shining, femora castaneous, tibiae and tarsi light castaneous, abdomen dark castaneous, apical margins of VI–VIII narrowly margined with yellow.

Head slightly declivent, impunctate, lightly clothed with suberect and erect silvery setae. Eyes prominent, antenniferous tubercles piceous, extending forward and slightly downward margining on the fore portion of eyes. Tylus prominent, extending nearly to apex of antennal segment I. Width across eyes 0.58, interocular space 0.35, length of head 0.48, length of antennal segments I–IV: 0.16, 0.35, 0.26, 0.46. Length of labial segments I–IV: 0.35, 0.40, 0.26, 0.32. Pronotum clothed with suberect and erect silvery setae, no apparent punctations, width of anterior lobe 0.86, posterior lobe 0.96, length 0.61. Posterior margin slightly sinuate.

Scutellum with erect silvery setae, basal margin slightly depressed, punctate except lateral margins and median, width 0.51, length 0.30.

Length of hemelytra 0.99, length of wing 1.86. Abdomen densely clothed with closely appressed silvery setae, length of abdomen and scutellum 1.92, width of abdominal tergite V 0.72. Total length 2.82.

Female somewhat larger, same general characteristics as above. Width of head across eyes 0.61, interocular space 0.37, width of anterior lobe of pronotum 0.96, posterior lobe 1.07, length 0.61. Length of scutellum 0.35, width 0.59. Length of abdomen and scutellum 1.92, width of abdominal tergite V 0.77. Total length 2.88.

Holotype: Male, Mayaguez, P. R., H. D. Tate, 9–10–35. Damaging Lawn, *Polytria amaura*. USNM 69850.

Paratypes: 19 ♂♂, 8 ♀♀, Mayaguez, P. R., H. D. Tate, 9–10–35. Damaging Lawn, *Polytria amaura*. 1 ♂, Mayaguez, P. R., 4–23–36, from *Eleusine indica*. 1 ♂, Ponce, P. R., July 20–22, 1914.

In general habitus this species resembles other species of the *leucopterus* complex, particularly *B. insularis*. However, it is smaller than *insularis*, and has greater contrast between the velvety black of the pronotum and both the nearly piceous tylus, and bluish pruinosity of the pronotum. In macropters, the distal spot of the corium is broader, the ratio of length to width not approximating 2:1 as in *insularis*. The peritreme of the scent gland is broader than most species of *Blissus*, and is only about ⅓ longer than broad.

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TELAMONA ARCHBOLDI, A NEW TREEHOPPER FROM FLORIDA (HOMOPTERA: MEMBRACIDAE)

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Nine strikingly marked male specimens of the genus *Telamona* were found among some Florida insects sent by Dr. S. W. Frost for determination. Except for one unidentified female collected in the same area three years earlier, nothing resembling these specimens was found in the United States National Museum collection which includes the F. W. Goding, E. D. Ball, and W. D. Funkhouser Membracidae collections. Literature search was no more fruitful. The species must be described as new.

The latest comprehensive taxonomic treatment of the genus *Telamona* is in Ball's (1939. Ent. Amer. 12:1–69) revision of the tribe Telamonini. Since that study only one new North American species of the genus (from California) was described. In Ball's paper the Florida specimens readily keyed to the "JJ" choice which leads to the species *westcotti* (misspelled *wescotti* in Ball's paper) Goding, *salvini* Distant, *reclivata* Fitch, and *vestita* Ball.

Along with *westcotti*, the Florida specimens have the posterodorsal angle of the pronotal crest rounded or obsolete (figs. 1b and 2b) and thus differ from members of the other three species where that angle is prominently subrectangular or acute.

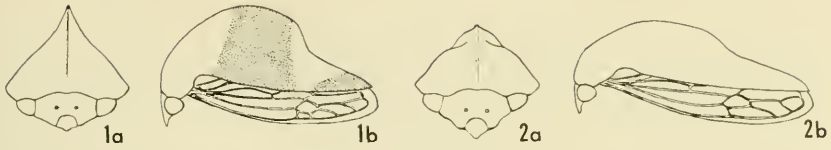
Separation of *westcotti* and the Florida form is readily possible by noting the shapes of the crest and the face. In the Florida specimens the crest is high and, in anterior view (fig. 1a), narrows gradually from base to dorsum, while in *westcotti* the crest is low and somewhat inflated so that in anterior view (fig. 2a) it narrows abruptly and very convexly to the dorsum. The face of the Florida specimens (fig. 1a) is much less triangular (clypeus protrudes less) than is the face of *westcotti* (fig. 2a). The most conspicuous difference between the two species is the unique, broad, transverse, dark brown band (fig. 1b) on the Florida specimens, a mark which is only slightly suggested by scattered mottlings on some specimens of *westcotti*.

Telamona archboldi, n. sp.

Either of two characters will separate this species from all other members of the tribe Telamonini: The broad, dark brown, transverse median band on the pronotum; or the shape of the high, compressed crest which slopes back uniformly (without a sinuation at anterior base) from the metopidium and has the posterodorsal angle rounded (without a prominent or acute angulation).

Holotype female: Length 8.3 mm, width across humeri 4.5 mm.

The accompanying illustrations (figs. 1a and 1b) give a clear idea of the general shape and appearance of this specimen. Face shining, with fine, well



separated punctures. Pronotum with crowded coarse punctures, space between punctures forming irregular, fine, longitudinal rugulae on band along lateral margin of posterior process. Tegmina coriaceous on basal third, distinctly punctate almost to apex of costal cell.

Face and anterior margin of pronotum (including calli and humeri) yellow to greenish yellow. Pronotum yellow (but appearing slightly darker due to brown punctures) with a broad, transverse, brown band near middle, and a longitudinal stripe on each side near apex of posterior process uniting apically to form, in dorsal view, a reddish brown V. Tegmina reddish brown on basal third, with fuscous brown apical cloud. Legs dark reddish brown, femora and tibiae with numerous small, but distinct and sometimes coalescing yellow spots.

Males very similar to female in color and form, the metopidium appearing a little less tumid. On one male, the anterior edge of the median transverse band projects as a spur above and remote from the humeral angle.

Holotype female: Florida, Lake Placid, Archbold Biological Station, May 23–31, 1964, Ronald W. Hodges (USNM 69793). Paratypes: Archbold Biological Station, Highlands County, Florida, April 21 to 25, 1967, and May 3 and 5, S. W. Frost, 9 males (U.S. Nat. Mus.).

The female was chosen holotype to conform with Ball's practice of defining species from that sex so that more meaningful comparisons could be made in this group where males show considerable variability of structure.

The species name is derived from the surname of Mr. Richard Archbold in recognition of his interest in and aid for science, not only through the establishment of this biological station, but also for his generous cooperation in various other scientific ventures.

NOTICE TO CONTRIBUTORS

Effective July 1, 1968, all manuscripts submitted for publication in the Proceedings, including notes of one page or less, **must be accompanied by an abstract** suitable for publication. The abstract must be typed on a separate sheet, should be brief (not more than 3% of the original), and written in whole sentences, not telegraphic phrases. Abstracts are not printed with notes of one page or less but will be sent to Biological Abstracts when the notes are published. Therefore, precede the abstract for notes with a paragraph giving the author's name, his affiliation in parentheses, the title of the article, and the abbreviated name of the journal.

MALE GENITALIA AND THE TAXONOMY OF POLYERGUS (HYMENOPTERA: FORMICIDAE)[1]

JEANETTE WHEELER, *Department of Biology, University of North Dakota, Grand Forks*[2]

Creighton (1950, p. 556) gave color as the only satisfactory character for the separation of the 2 subspecies *Polyergus rufescens bicolor* Wasmann ("head brownish red, gaster piceous brown and distinctly darker than the head") and *P. r. breviceps* Emery ("head, thorax and gaster ferrugineous to brownish red"), although he admitted (p. 558) that color was frequently not reliable in these subspecies. During the preparation of our book (1963) on the ants of North Dakota I had difficulty trying to separate *P. r. bicolor* and *P. r. breviceps* consistently, because I found so much internidal variation in color. I should not have been so surprised, however, because Smith (1947, p. 150–151) had remarked on the great amount of variation within a species or even in one nest of fresh specimens in the genus *Polyergus*. I arranged all of our material in "classes" according to color. Those ants without any infuscation I classed as "0" and those with slight infuscation as "+." We had material which Dr. Smith (*in litt.*) had identified as *P. r. breviceps* (0) and as *P. r. fusciventris* Wheeler (+). Since Creighton (1950, p. 559) sank *fusciventris* to a synonym of *breviceps*, I called these specimens all *breviceps*. We also had material which Dr. Smith (*in litt.*) had called *P. r. bicolor*; these were either moderately (++) or heavily (+++) infuscated. This infuscation involved the gaster, legs and sometimes the petiole. However, when I took all the specimens from a nest and tried to classify each one, I found that the color could range from 0 to ++ or from + to +++ in the same nest. On the other hand, some samples contained specimens of only one or two classes. It should be noted that we said (1963, p. 276): "In no case . . . has the total possible range of color been found in one nest." With the usually short series of *Polyergus* workers collected and the variability observed we decided to call our North Dakota material *P. rufescens* Latreille.

This was not a satisfactory situation. But I could not agree with Kannowski (1956, p. 185) in recognizing *P. breviceps* as a separate species nor with Gregg (1963, p. 635–638) who raised *P. bicolor* to specific rank by the use of the color of the workers as the separatory character.

Forbes and Brassel (1962) suggested the use of the male genitalia

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for separating the subspecies of *P. rufescens*. I did not see this paper nor did I have enough males before our book was published to try to untangle our North Dakota subspecies on these characters. By September, 1965, I had collected or received several samples containing large series of males. In *bicolor*: Hauge #340 from the University of North Dakota Forest River Biology Area, about 35 miles northwest of the Oakville Prairie Biology Area, 26 males; Sather #58 from Turtle River State Park, 10 miles northwest of the Oakville Prairie Area, 25 males; Wheeler #2030, Billings County, near the western edge of the state, 9 males. In *P. r.* ssp?: Wheeler #125 from Teton County, Wyoming, 25 males. In *breviceps*: A. C. Cole, collected near Cimmaron, New Mexico, 1 male; R. E. Gregg from Harvey, Illinois, 1 male; Limvere, Oakville Prairie Biology Area of the University of North Dakota, 3 separate nests with 25 males each; Wheeler #2166, same locality, 5 males; Wheeler #2252 about 1½ miles south of the Oakville Prairie Area, 15 males. In *umbratus* Wheeler: A. C. Cole from Moran, Wyoming, 6 males; R. R. Snelling from Los Angeles County, California, 2 males. In *P. lucidus* Mayr: Collected by W. M. Wheeler—1 male from Colorado Springs, Colorado; 1 from Bronxville, New York, 1905; 1 from Bronxville, New York, 1908. Total: 193 males.

Borgmeier (1950, fig. 18–31) showed intranidal differences, and even bilateral asymmetry, in the genital apparatus of *Atta sexdens* L. Clausen (1938) gave the number of specimens studied for each species, drew outlines showing the variations for the genital plates and also gave the extremes and means for all the various measurements on numerous species. For *Formicia rufa rufa* L. he had 100 males from one nest (but probably from different queens). Here he gave the extremes, the means, the standard deviation and the coefficient of variation for each character which he had measured on the left and right halves of the genital plates (tables 14–17, p. 303–306) and he concluded (p. 310) "das die Variabilität des Geschlechtsapparates grösser ist als die Variabilität der Merkmale des äussern Körperbaues." Weber (1948, pl VII, p. 280) showed four samples of variation in the middle valve (= volsella) of 26 forms in the genus *Myrmica* and mentioned the differences in his descriptions (1947, 1948, 1950). Forbes and Brassel (1962), however, did not mention any variability in the 10 male specimens of *P. lucidus* or the three specimens of *P. r. breviceps*; nor did they mention any bilateral asymmetry in those males nor in their single specimens of *P. r. bicolor* and *P. r. umbratus*. This is the only paper in which Forbes gave the number of specimens examined. In none of his other papers on the male genitalia was the sample size mentioned nor was any variability noted (Forbes 1954 and 1956; Forbes and Do-Van-Quy, 1965; Forbes

Fig. 1. Reported ranges of the 4 subspecies of *Polyergus rufescens* Lat.

and Hagopian, 1966). Krafchick (1959) did not illustrate any variations for the subgenital plate in *P. lucidus* nor in *P. r. breviceps*. He made one drawing for the "penis valve" (= aedeagus) of *P. lucidus*.

If *P. r. bicolor* and *P. r. breviceps* are subspecies, they should be largely allopatric but with overlapping range-edges. Using the data given by Creighton (1950), Gregg (1963), and Smith (1951, 1959, and 1967) (and adding our own collections from Canada) I have constructed a map, fig. 1, which shows that the subspecies of *P. rufescens* cannot be separated as geographic races and that the range of *P. r. breviceps* includes the ranges of the other 3.

Forbes and Brassel (1962, p. 85) said that the greatest differences between the subspecies in the male genitalia occurred in the length and curvature of the digitus of the middle value (= volsella); but they did not show how to measure that character. Therefore, I have used Clausen's measurement (fig. 2, l. v.) for the base line and added the length of the digitus (l. d.) to the "depth" (d. d.) as a measure of the length and curvature of the digitus combined. It seemed to me that a ratio [l. d. + d.d./l.v] would be meaningful since it relates length and curvature of the digitus to the length of the volsella. While

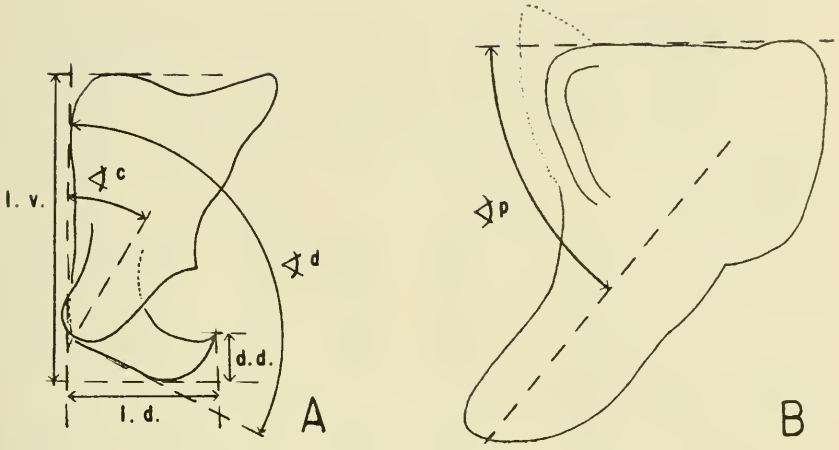

Fig. 2. Orientation for measurements. A, Volsella: angle c = angle between the cuspis and the volsellar dorsum; angle d = angle between the posterior end of the digitus and the volsellar dorsum; d.d. = depth of the digitus; l. d. = length of the digitus; l.v. = length of the volsella. B, Paramere: angle p = angle between the paramere and the basiparamere.

these measurements were being made I was struck by the difference between the two halves on the same individual. Therefore, I calculated the coefficients of regression for the larger nests samples. The results showed that there was no correlation between the ratios of the two valves on the same individual. (Calculations not shown here.)

The means of the ratios for the smaller volsellae and the means for the larger volsellae on the same individual in the subspecies *breviceps* cover nearly the entire range for the means of the ratios for both volsellae in all of the nests in all the taxa considered (see 4th and 5th columns in table 1). The standard deviations show that these differences have no statistical significance. This lack of statistical difference suggests strongly that these characters can have no taxonomic significance.

On first inspection I thought that the angles of the cuspis of the volsella (angle c) which Clausen (1938, p. 294) used and which Forbes and Brassel (1962, p. 83) suggested looked promising as a separatory character for *breviceps* and *bicolor*. I also devised two other angle measurements (angle d and angle p, as shown in fig. 2). These angles were measured on 193 (386 halves) prepared specimens with a mineralogical circular stage microscope. The means (± one standard deviation) of the material from the Oakville Prairie Biology

Table 1. Comparison of the ratios of the length of the digitus plus the depth of the digitus (X384) to the length of the whole volsella (X80) $\left[\frac{= \text{l. d.} + \text{d. d.}}{\text{l. v.}}\right]$ for the larger and smaller ratios on each specimen in the larger nest samples in the 3 subspecies of *P. rufescens*. Totals include volsellae whose mates were lost or damaged in processing.

Collector		min.	max.	N	$\bar{X}$	s.d.
P. r. bicolor						
Hauge #340	sm	206	274	23	244	17.32
	lr	218	284	23	258	16.9
	Total	206	284	49	246	17.65
Sather #58	sm	212	285	22	233	19.6
	lr	221	296	22	257	20.8
	Total	212	296	46	244	21.2
P. r. ssp.?						
Wheeler #125	sm	228	272	18	253	15.0
	lr	235	296	18	266	15.8
	Total	228	296	42	259	16.59
P. r. breviceps						
Limvere #1	sm	204	248	17	230	11.86
	lr	224	269	17	248	12.35
	Total	204	269	41	240	18.38
Limvere #2	sm	208	296	18	233	20.6
	lr	228	300	18	251	20.4
	Total	208	300	42	242	21.3
Limvere #3	sm	204	261	24	239	16.57
	lr	208	284	24	254	19.25
	Total	204	284	48	247	19.22
Wheeler #2522	sm	214	252	12	235	13.8
	lr	216	278	12	251	18.6
	Total	214	278	24	243	18.1
P. r. umbratus						
Cole #163	sm	197	240	6	212	16.4
	lr	202	261	6	223	21.5
	Total	197	261	12	217	18.8

Area include the entire range of the means of all other samples in each of the three measured angles (table 2 c, d, p).

It is obvious that none of these measurements then can be used as key characters. Furthermore the aedeagus is even more variable in length and in number of teeth (even on the two halves of the same individual) and hence obviously cannot be used. In fact, the teeth were so variable in size and so difficult to count that my replicates differ even at a magnification of 384×, therefore the aedeagus measurements are not included in the table.

Forbes and Brassel (1962, p. 85) also said: "Since the subgenital plate differed in all the forms examined, the configuration of this

Table 2. Minimum, maximum, sample size, mean and standard deviation for the angles of the digitus (angle d) and cuspis (angle c) on the volsella, and the angle of the paramere (angle p).

	angle d					angle c					angle p				
Collector	min.	max.	N	$\bar{X}$	s. d.	min.	max.	N	$\bar{X}$	s. d.	min.	max.	N	$\bar{X}$	s. d.
P. r. bicolor															
Hauge #340	107	126	47	116	5.0	24	56	47	36	6.5	54	89	46	70	9.5
Sather #58	106	127	32	118	3.3	18	48	32	36	6.9	52	96	45	71	10.0
Wheeler #2030	110	135	15	122	6.7	28	46	15	38	3.5	66	85	10	72	10.5
P. r. ssp.?															
Wheeler #125	99	183	47	114	11.7	24	65	47	38	8.9	51	92	44	69	10.2
P. r. breviceps															
Cole	123	133	2	128	—	44	49	2	47	—	60	74	2	67	—
Gregg	111	112	2	112	—	40	40	2	40	—	77	82	2	80	—
Limvere #1	100	147	43	118	8.2	25	57	39	41	6.8	51	90	39	65	11.3
Limvere #2	102	128	44	112	6.5	26	55	44	40	6.7	50	88	42	71	9.4
Limvere #3	104	129	36	116	6.8	24	52	36	36	7.7	53	95	39	69	10.5
Wheeler #2166	102	120	5	115	13.2	24	35	5	31	5.7	—	—	—	—	—
Wheeler #2522	110	135	15	122	6.7	28	46	15	38	3.5	50	85	10	72	10.5
P. r. umbratus															
Cole #163	112	131	12	122	4.1	28	48	12	40	6.3	48	81	11	68	10.6
Snelling	125	138	4	132	5.9	30	43	4	36	6.6	48	73	4	64	11.6
P. lucidus															
W. M. Wheeler	106	150	6	123	18.5	24	50	6	33	12.0	47	69	6	61	9.0

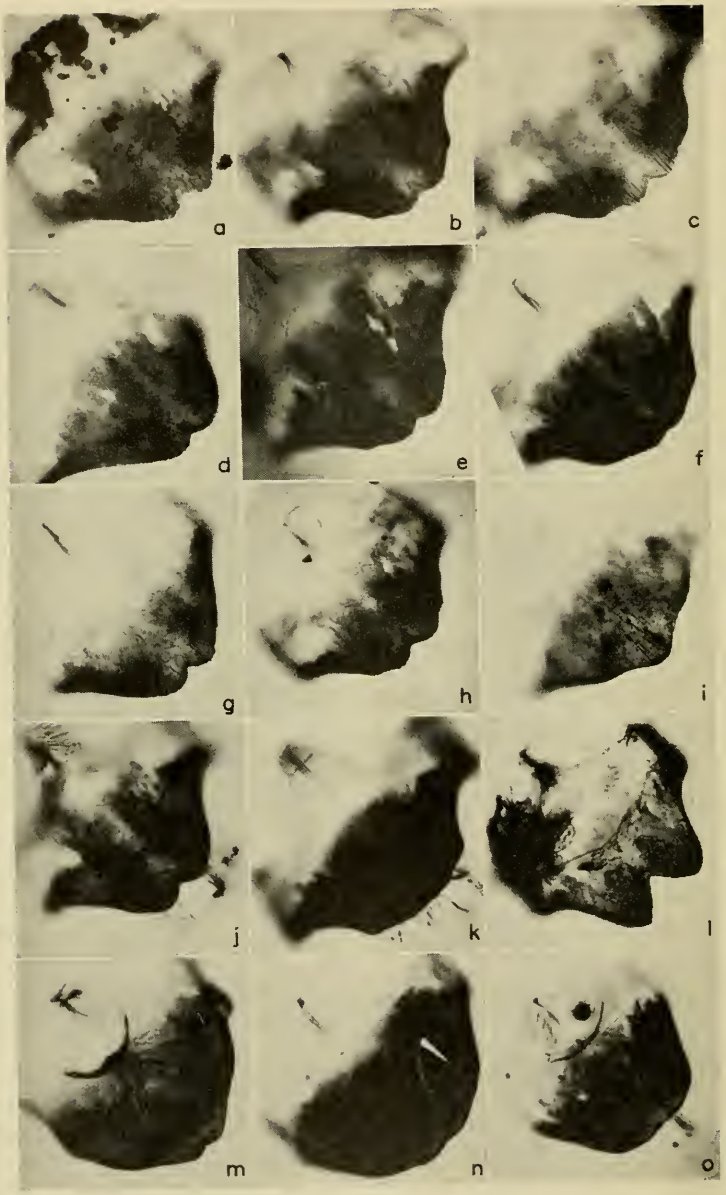

Fig. 3. Subgenital plates; all ×50; dorsal view, with the posterior end directed toward the letter. *P. r. bicolor* Wasm.: a-c, Hauge #340. *P. r.* ssp?: d-f, Wheeler #125. *P. r. breviceps* Emy.: g, Gregg; h, Limvere #1; i, Cole. *P. r. umbratus* Whlr.: j and l, Cole #163; k, Snelling. *P. lucidus* Mayr: m, Colorado Springs; n, Bronxville-1905; o, Bronxville-1908.

segment may be a highly important differentiating aid." I found no constant character within any nest series (see photographs, fig. 3) which I could measure and further more, there was too much variation within each putative taxon (and even in the same nest) to use the subgenital plate as a key character. Referring to my fig. 3: a, d, g, j, and m all have a definite median notch and little or no shoulder, which approaches Forbes and Brassel's fig. 15 (1962, p. 84) for *P. r. bicolor* and Krafchick's fig. 9B (Pl. 12) for *P. r. breviceps*. My fig. 3: b, c, e, f, h, and n have a median notch and more or less distinct shoulders; this is the commonest type in my material but has not been illustrated by any other authors. My fig. 3: i, k, l and o are uniques for my series but i approaches Forbes and Brassel's fig. 11 (p. 84) for *breviceps*; this is the only one in my 93 specimens of *P. breviceps* which looked like this. None of my eight specimens of *P. r. umbratus* resemble Forbes and Brassel's fig. 19 (1962, p. 84). Of my three specimens of *P. lucidus* (fig. 3, m—o) none looked like the drawings made by Forbes and Brassel (1962, p. 82, fig. 4) nor by Krafchick (1959, pl. 12, fig. 9A).

Mr. Roy R. Snelling (*in litt.*) has reported a careful comparison of the external characters of the queen, worker and male of the European *P. rufescens* with our North American material. He concludes that the two are separate but closely related species. Our specimens, therefore, should be called *P. breviceps* Emery.

Conclusions

1. Our North American *Polyergus* should be considered as one species without subspecific designations because:

   a. None of the putative subspecies can be separated as geographic races.

   b. *P. r. bicolor, P. r. breviceps*, and *P. r. umbratus* cannot be separated by the characters of the male genitalia.

   c. *P. r. bicolor* and *P. r. breviceps* cannot be separated in many long series on the one accepted criterion of color.

2. Our North American material is a species distinct from the Old World *Polyergus rufescens* (Latr.) and should be called *P. breviceps* Emery.

Acknowledgments

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A NEW SPECIES OF MICRACANTHIA REUTER FROM OREGON (HETEROPTERA: SALDIDAE)

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The genus *Micracanthia* Reuter is chiefly Holarctic in distribution. Three species are known from Europe and Asia, ten from North America including the Caribbean Islands and one from South America. Although most of the North American species are found in central and southern United States, there are a few that are more boreal in their distribution, at least one reaching Alaska. The three Old World species belong to this latter category, suggesting dispersal north and west across the Bering Strait into northern Asia and Europe. The fact that the genus does not penetrate into the lower latitudes in the Palaearctic region suggests that this dispersal occurred during a time when the Bering region was cool to cold, perhaps during the Pleistocene. *M. fennica* (Reuter) is the only species now known to be Holarctic. Although only one species is known from South America, additional species are likely to be found.

Most workers have considered *Micracanthia* to be a valid genus, but Cobben (1960a) has questioned its status, suggesting that this taxon might be a subgenus of *Saldula* Van Duzee. Several characters have been used to separate *Micracanthia* from *Saldula*, these include: reduced nature of the hemelytral veins, the unforked medial vein on the hemelytra and the small size of most species. There are some species of *Saldula* with reduced veins (R. H. Cobben, personal communication); when the inner surface of the hemelytron is examined, the medial vein is branched; and there are small species of *Saldula*. The establishment of generic limits in the Saldidae is a very difficult problem (*vide* Cobben, 1959). A careful comparison of critical characters of all members of *Micracanthia* is needed to establish the proper status. At some future date it may be necessary to alter our present concept.

Micracanthia schuhi, n. sp.

Head: Black, surface roughened; dorsally with short, semi-adpressed golden pubescence, ventral surface with longer, semi-erect white pubescence; transverse swelling, maxillary plates, anteclypeus and median portion of labrum, glabrous. Three pairs of trichobothria, anterior pair shortest; round yellow spot between ocellus and eye. Male with transverse swelling (except at middle), base of mandibular plates, maxillary plates, anteclypeus (except base) yellow; female

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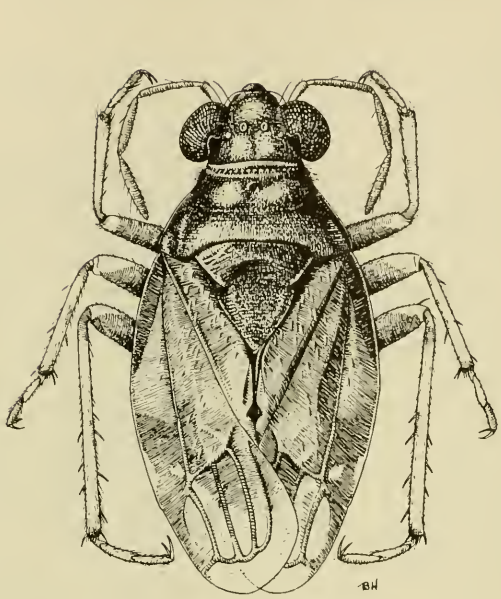

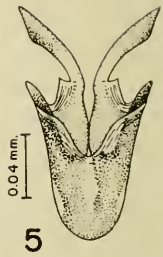

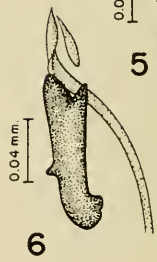

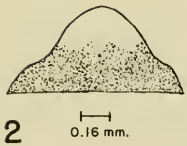

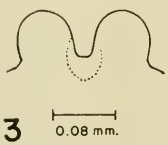

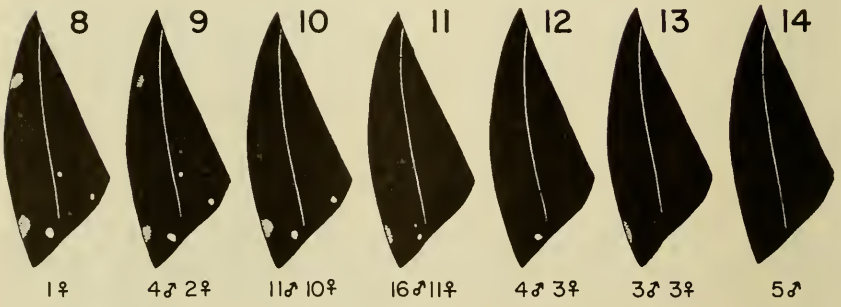

Figs. 1–14, *Micracanthia schuhi*, n. sp.: 1, holotype male, dorsal view; 2, female subgenital plate, ventral view; 3, parandria of male, posterior view; 4, male paramere, lateral view; 5, median sclerotized structures of aedeagus, frontal view; 6, median sclerotized structures of aedeagus, lateral view; 7, base of penis filum, lateral view; 8–14, eunomic series of hemelytra.

with transverse swelling black except for small brown spot laterad, mandibular plates pale basally, anteclypeus brown except extreme apex, labrum yellow-brown in center. Antennae: dark brown, segment 1 pale on inner surface, segments 2, 3 and 4 concolorous; clothed with short, semi-erect pale pubescence, segments 3 and 4 with scattered, erect black setae. Rostrum attains hind coxae.

Thorax: Pronotum and scutellum black, with short, adpressed golden pubescence, pubescence white along lateral margin of pronotum, lateral one-third of collar and on venter; surface finely rugulose, semi-shining; posterior third of scutellum transversely rugulose. Pronotum transverse, anterior margin straight, collar set off by distinct transverse row of coarse punctures; anterior angle rounded, slightly protruding; lateral margins strongly convergent, straight to very lightly convexly arcuate; posterior angle slightly obtuse, very narrowly rounded; posterior margin broadly and deeply concave except at lateral one-fifth. Scutellum very slightly wider than long; anterior third slightly raised, posterior margin of anterior third convex medially; posterior two-thirds slightly swollen. Venter black, polished. Legs with all coxae black, very narrowly pale at apices; trochanters light brown, pale anteriorly; anterior and middle femora black-brown, narrowly pale at apex, apical one-third of dorsum pale; tibia pale yellow-brown, darker at apex and base, faint brown median band, spines on hind tibia brown-black; first 2 tarsal segments pale, third segment embrowned apically (coloration of female legs more distinct than in male).

Hemelytra: Macropterous; scattered adpressed yellow pubescence in addition to short, decumbent black hairs; surface dull black, costal margin narrowly semi-shining; faint pale spot at apex of clavus, white spot at postero-median angle of exocorium, yellow-brown costal spot just before apex (rarely with second yellow-brown pale spot on basal third), membrane embrowned with faint pale spots in cells (eunomic variation of narrow range, see figs. 8–14).

Abdomen: Black, with fine yellow-brown pubescence, posterior margins of segments narrowly pale. Subgenital plate of female posteriorly produced in middle (fig. 2), black basally, produced portion yellow-brown. Parandria of male black (fig. 3). Male paramere (fig. 4) broadest through processus sensualis; processus hamatus slightly recurved, acuminate. Base of penis filum coiled two and one-half times (fig. 7); median sclerotized structure of penis as illustrated (figs. 5, 6); organization typical for *Micracanthia* but details differ (*vide* Cobben, 1960 b, p. 60, fig. 58).

Measurements: Male (34 examples) length 2.64–3.13 mm (mean 2.87 mm; SD .13 mm); width 1.27–1.43 mm (mean 1.38 mm; SD .06 mm); Female (20 examples) length 2.86–3.35 mm (mean 3.09 mm; SD .14 mm); width 1.43–1.76 mm (mean 1.58 mm; SD .09 mm).

Holotype: Male, Oregon, Clackamas County, Still Creek, 2 mi. E. Government Camp, Timberline Lodge Road (Mt. Hood), 4350 ft., August 10, 1964, J. D. Lattin and T. Schuh. USNM 69874.

Allotype: Female, same data as holotype.

Paratypes: 42 males, 29 females; same data as holotype; Oregon, Hood County, Iron Creek, 2 miles N. Bennett Pass (Mt. Hood), 4259 ft., August 10, 1964, J. D. Lattin and T. Schuh; Oregon, Mt. Hood, Clackamas County, 4100 ft., K. Goeden (same as type locality);

Oregon, Linn County, 1 mi. S. Marion Forks, July 18, 1965, K. Goeden. Paratypes deposited in: U. S. National Museum; California Academy of Sciences, San Francisco; Canadian National Collection of Insects; University of Kansas, Lawrence; Oregon State University, Corvallis; Oregon Department of Agriculture, Salem; and the personal collections of R. H. Cobben, J. T. Polhemus and J. Schuh.

M. schuhi may be recognized by the distinctive eunomic pattern of the hemelytra, the scattered golden pubescence of the dorsum, the straight-sided pronotum and the distinctive male and female genitalia. It appears most closely related to *M. ripula* Drake, described from Churchill, Manitoba. Female homeotypes, compared by John T. Polhemus and kindly sent to me by Randall T. Schuh, were used for comparison. I have since examined the type of *ripula* at the Canadian National Collection of Insects (through the courtesy of L. A. Kelton). *M. schuhi* differs from *ripula* in having the female genital plate more strongly produced posteriorly and yellow-brown instead of white; more deeply arcuate posterior margin of the pronotum; eunomic variation (*vide* Brooks and Kelton, 1967, fig. 118 and Schuh, 1967, fig. 29 for *ripula*); distinctly golden hemelytral pubescence, particularly on clavus compared to silver-white to soiled yellow pubescence in *ripula*; the semi-shining condition of pronotum and scutellum as opposed to rugulose, dull surface of *ripula*.

Micracanthia schuhi represents a cool adapted segregate of the genus. At present known only from the northern Cascade Mountains of Oregon around the 4000 ft. level, it seems likely that it will be recovered from other localities within the range. *M. ripula* has a much wider distribution, being known from British Columbia (Scudder, 1961); Yukon Territory, Alberta, Saskatchewan and Manitoba (Brooks and Kelton, *op. cit.*) and northern Michigan (Schuh, *op. cit.*).

The new species occupies a very uniform habitat, a uniformity further expressed by the small amount of eunomic variation. It was collected from sphagnum-type moss at the edge of several small mountain creeks and was not found in more exposed situations so typical of many species of saldids. Specimens were driven out of the moss with smoke and alcohol spray and easily collected with an aspirator. At one site (Still Creek), the water temperature was 43.5°F. This normally would produce a very cool microenvironment, but when the sun hit this spot for a short time around noon the temperature in the moss just below the surface averaged 90°F. By slight movement within the moss the saldids could select an area of optimal temperature. The other species of *Micracanthia* personally collected by me have preferred a damp substrate with some scattered cover but never as dense as that found for *M. schuhi*. In that respect, it resembles *M. fennica* (Reuter), a species normally found in bogs and moors in

Europe although Brooks and Kelton (*op. cit.*) record it from grassy lake margins and mossy edges of ditches. *M. ripula* has been collected from a sandy substrate with scattered cover (Schuh, *op. cit.*) and Brooks and Kelton recorded it from essentially the same type of habitat.

Although the North American saldid fauna is fairly well known, collectors are urged to seek out the less obvious habitats for additional species certain to be found. Only then will a complete analysis of our fauna be possible.

This is, in a sense, a triple patronymic. It is dedicated to Randall T. (Toby) Schuh, my very able assistant who helped collect so many specimens of Saldidae including this new species; to Mr. Joe Schuh, an old friend and field companion who has provided me with so many specimens of Oregon Heteroptera during the past years; and to Mrs. Joe Schuh who has maintained such a favorable "habitat" for entomologists in her home besides being very active in 4-H entomology work.

I am indebted to Mrs. James (Bonnie) Hall for the fine illustrations of this new species.

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NEW NORTH AMERICAN SPECIES OF CERATOSMICRA ASHMEAD (HYMENOPTERA: CHALCIDIDAE)

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In 1940, I published a revision of the genus *Ceratosmicra* Ashmead for North America (Burks 1940). Since that time, two additional species have been found. In this paper, I give a revised key to the North American species of the genus and new distribution summaries for the described species, plus descriptions of the two new species.

All the North American species of *Ceratosmicra* but one have been reared, and those that have been reared are secondary parasites. They emerge from the cocoons of braconid or ichneumonid primary parasites. All the species of *Ceratosmicra* are small, not over 5 mm long, with most specimens no longer than 4 mm. The following combinations of characters will distinguish *Ceratosmicra* from all other genera of the superfamily Chalcidoidea:

Antennae inserted at or slightly above level of ventral margins of compound eyes, apex of scape reaching or exceeding level of vertex, flagellum composed of 1 elongate ring segment, 7 funiculars, and a 3-segmented club which is only slightly separated from the funiculus; malar furrow present; thorax with notaulices complete, mesopleuron with a distinct femoral furrow, and prepectus greatly reduced in size; hind coxa elongate, round in cross section; hind femur enlarged, bearing a row of minute, closely set teeth on outer ventral margin; hind tibia curved, apex acute and bearing one apical spur; tarsi 5-segmented; petiole long, at least ¾ as long as hind coxa and may be longer than hind coxa; petiole inserted at apex of propodeum; apical abdominal tergum with a pair of sessile, disc-shaped cerci.

KEY TO SPECIES

1. A strong tooth projecting from venter of propodeum between bases of metacoxae; petiole 14 or more times as long as wide at its widest point ..... **debilis** (Say)
   Propodeum without a ventral tooth; petiole shorter 2

2. Petiole gradually enlarged from base to apex (fig. 1); forewing with an apical dark spot ..... **provancheri**, n. sp.
   Petiole either enlarged in the middle or virtually uniform in size from base to apex; forewing without an apical spot 3

3. Petiole strongly enlarged in the middle (fig. 2); thorax predominantly yellow or light tan with a dark brown to black, longitudinal, dorsal median stripe ..... **meteori** Burks
   Petiole slightly or not at all enlarged in the middle; thorax yellow, without distinct markings, or predominantly black 4

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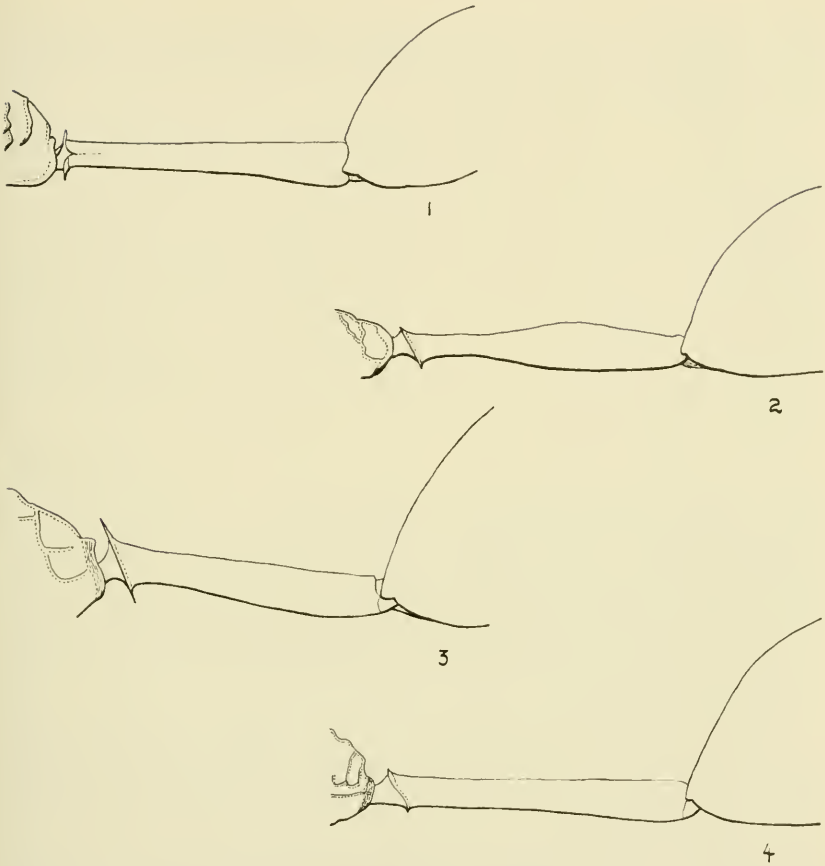

Figs. 1–4. Petioles of *Ceratosmicra* spp., lateral aspect: 1, *provancheri*, n. sp.; 2, *meteori* Burks; 3, *campoplegicis*, n. sp.; 4, *immaculata* (Cresson).

4. Propodeum with a tooth projecting posteriorly on each side of the base of the petiole ..... **paya** Burks
   Propodeum entirely without teeth 5

5. Body predominantly black; first funicular segment longer than second; flange at base of petiole broad (fig. 3) ..... **campoplegicis**, n. sp.
   Body entirely light yellow, sometimes vaguely stained with darker yellow or pale tan; first and second funiculars equal in length; flange at base of petiole narrow (fig. 4) ..... **immaculata** (Cresson)

Ceratosmicra provancheri, n. sp.

This species, with its predominantly black thorax with broad yellow markings and its broad head, suggests a member of the *xanthostigma* group of the genus *Spilochalcis*. Its long, slender petiole, however, refers it to *Ceratosmicra*. It

differs from all other North American species of *Ceratosmicra* in having the petiole gradually enlarged from base to apex, in having a dark spot in the outer apical angle of the forewing, and in the fact that the apex of the ovipositor does not reach the apex of the gaster.

Description.—Black, with bright yellow mouthparts, anterior coxae, eye margins, frons, and a transverse line intersecting anterior ocellus; pronotum yellow except for anterior declivity and a submedian and sublateral black spot on each side; broad yellow bands at lateral margins of prescutum and scapulae and a broad yellow band at each lateral margin of scutellum; a yellow spot on pleuron at base of hindwing; and a yellow dorsal spot on first gastral tergum. Antennae tan or brown, inner side of scape darkened; tegula and wing veins brown, apical angle of forewing stained with brown; mid coxa light brown, hind coxa dark brown with lighter longitudinal stripe on ventral side; fore and mid femora brown, apices lighter, hind femur brown with broad tan spot at base and near apex; fore and mid tibiae cream colored, hind tibia tan; all tarsi white; petiole red-tan, gaster dark brown, almost black.

Female: Length, 3.5 mm. Apex of antennal scape reaching level of vertex; ring segment ½ as long as pedicel, funicular segments 1–7 equal in length and each ¾ as long as pedicel, club twice as long as pedicel. Scrobe cavity shallow, laterally ecarinate, bases of antennae separated by a space twice as great as diameter of antennal socket; labrum 4 times as broad as long; left mandible with 2 teeth, right with 3, median tooth smaller than dorsal or ventral tooth. Malar furrow curved, length of malar space ⅖ the eye height. Maximum diameter of lateral ocellus slightly greater than length of ocellocular line and ½ as great as length of postocellar line. Width of head slightly greater than maximum width of thorax.

Anterolateral angles of pronotum weakly carinate, anterior margin ecarinate; apex of scutellum shining; mesepisternum setose ventrally; metepisternum completely covered with long setae; metanotum with a single row of setae along anterior margin. Hind femur with an inner tooth and with 20 closely set, minute outer ventral teeth.

Propodeum without lateral or apical teeth; surface of propodeum with closely set, convoluted rugae. Petiole with basal flange broad on both dorsal and ventral sides and petiole gradually enlarged from base to apex (fig. 1), as long as hind coxa and ¾ as long as gaster. Entire gaster shining; apices of ovipositor sheaths not reaching apex of gaster.

Male: Unknown.

Type locality.—Inglenook, Pennsylvania.

Type.—USNM 69695.

Described from 3 specimens: Holotype ♀, Inglenook, Pa., collected May 28, 1911; Paratypes: 1♀, Springbrook, Pa., collected May 24, 1945; 1♀, Natick, Mass., collected May 30, 1936 on hickory, C. A. Frost. All specimens in U.S. National Museum collection.

Host.—Unknown.

Ceratosmicra campoplegicis, n. sp.

The predominantly black head and thorax, with rather irregular yellow markings, suggest that this is a member of the *side* group of the genus

Spilochalcis, but the long, slender petiole and distinct malar furrow will refer *campoplegicis* to *Ceratosmicra*. *C. campoplegicis* most closely resembles *immaculata* (Cresson) in lacking propodeal teeth and in having the petiole straight; the two differ in color, *immaculata* being entirely yellow and *campoplegicis* mostly black, and in that the flange at the base of the petiole is narrow in *immaculata* and broad in *campoplegicis*.

Description.—Black, with yellow or pale tan on mouthparts, borders of eyes and antennal sockets, dorsum of pronotum except for 2 black sublateral spots and sometimes a pair of black or brown submedian spots, lateral margins of prescutum and scapulae, lateral margins of scutellum, tegula and spot on pleuron at base of wings, all of fore leg except inner side of fore coxa, mid leg except for base of mid coxa, elongate stripe on dorsal angle of hind coxa, vaguely defined spots at base, on dorsum, and near apex of hind femur, base and apex of hind tibia, and hind tarsus, apicolateral areas of propodeum, base of petiole, dorsal spot on first gastral tergum, and transverse stripes on following gastral terga; inner side of antennal scape black, antenna otherwise tan; wings hyaline, veins brown.

Female: Length, 3.5–4.0 mm. Apex of antennal scape reaching level of vertex; ring segment ¼ as long as pedicel, first funicular segment as long as pedicel, funiculars 2–7 equal in length and each ¾ as long as pedicel, club twice as long as pedicel. Scrobe cavity shallow, margins ecarinate, bases of antennal scapes separated by a space equal to diameter of one antennal socket; labrum 3 times as broad as long; left mandible with 2 teeth, right with 3 teeth, all of which are subequal in size. Malar furrow curved, length of malar space ⅓ of the eye height. Maximum diameter of lateral ocellus 1⅓ times length of ocellocular line and ½ as great as length of postocellar line. Width of head equal to width of thorax.

Entire dorsum of thorax densely setose; anterolateral angles of pronotum weakly carinate, anterior margin dorsally ecarinate; apex of scutellum sculptured, nonshining; mesepisternum setose ventrally; metepisternum completely covered with long setae; metanotum setose on meson. Hind femur with a distinct, sharp inner tooth and 18–19 closely set, minute, outer ventral teeth.

Propodeum without lateral or apical teeth, bearing a short, median, dorsal carina at base, this branching obliquely laterally to form 2 carinae that reach lateral propodeal margins at about midpoint between base and apex; areas within carinae of propodeum smooth; long setae borne at apex of propodeum. Petiole with basal flange broad, fig. 3; petiole ¾ as long as hind coxa; gaster elongate, twice as long as petiole; ovipositor sheaths slightly protruding.

Male: Unknown.

Type locality.—Riverside, California.

Type.—USNM 69696.

Described from 6 specimens: Holotype ♀, Riverside, Calif., Aug. 1, 1957, reared from an undetermined member of the Campoplegini parasitic on *Catabena esula* Druce on *Lantana* sp., B. Puttler; Paratypes: 1 ♀, Camino, Calif., July 27, 1948, H. M. G. and D. Townes; 1 ♀, San Jacinto, Calif., Sept. 20, 1958, collected on alfalfa, E. I. Schlinger; 1 ♀, 10 mi. N.E. Folsom, Sacramento Co., Calif., May 11,

1960, collected on *Eriodictyon californicum* (Hook & Arn.) Tarr., M. Wasbauer; 1 ♀, Graham Mts., 7500 ft, Ariz., July 8, 1957, sweeping, G. D. Butler; 1 ♀, 1 mi. S. Hood River, Oreg., Aug. 4, 1941, Joe Schuh. One paratype in Oregon State University collection, Corvallis, Oregon; 1 paratype in University of Arizona collection, Tucson, Arizona; the other specimens in U.S. National Museum collection.

Host.—Undetermined Campoplegini (Hymenoptera, Ichneumonidae) parasitic on *Catabena esula* Druce (Lepidoptera, Noctuidae).

Since my revision of this genus was published in 1940, much additional material has been accumulated. The distribution records of the four species included in 1940 are now as follows:

Ceratosmicra debilis (Say)

Rhode Island west to Minnesota, Kansas, and California, south to Mexico, West Indies, and Venezuela.

Ceratosmicra immaculata (Cresson)

Texas, south to Venezuela and Peru.

Ceratosmicra meteori Burks

Massachusetts west to Illinois, south to Louisiana, Texas, and Mexico.

Ceratosmicra paya Burks

Georgia, Illinois, Kansas, Texas, and California.

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AMYNOTHRIPS ANDERSONI, A NEW GENUS AND SPECIES INJURIOUS TO ALLIGATORWEED

(THYSANOPTERA: PHLAEOTHRIPIDAE)

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This paper makes available a name for a South American thrips species that has been introduced into the United States (Denmark, 1967) to help control the alligatorweed, *Alternanthera philoxeroides* (Mart.) Gris. This weed occurs in inland waterways in all southern states, Texas, and California, where it interferes with drainage and navigation and displaces desirable wildlife food plants (Zeiger, 1967). A subsequent paper will revise the subtribe Thorybothripina Priesner, to which the alligatorweed thrips belongs.

I am indebted to many persons for help in my studies of thorybothripines. I especially wish to thank those who have made types available to me: H. Priesner, Linz, Austria; L. de Santis, Universidad Nacional de La Plata, Republica Argentina; L. A. Mound, British Museum (Natural History), London; and Paul Arnaud, California Academy of Sciences, San Francisco. I am grateful as well to T. N. Ananthakrishnan, Loyola College, Madras, India, and R. zur Strassen, Senckenberg Museum, Frankfurt am Main, Germany, for loans of specimens. A. Silveiro Guido, Universidad de la Republica, Montevideo, Uruguay, kindly provided Uruguayan material and gave me information about alligatorweed thrips ecology.

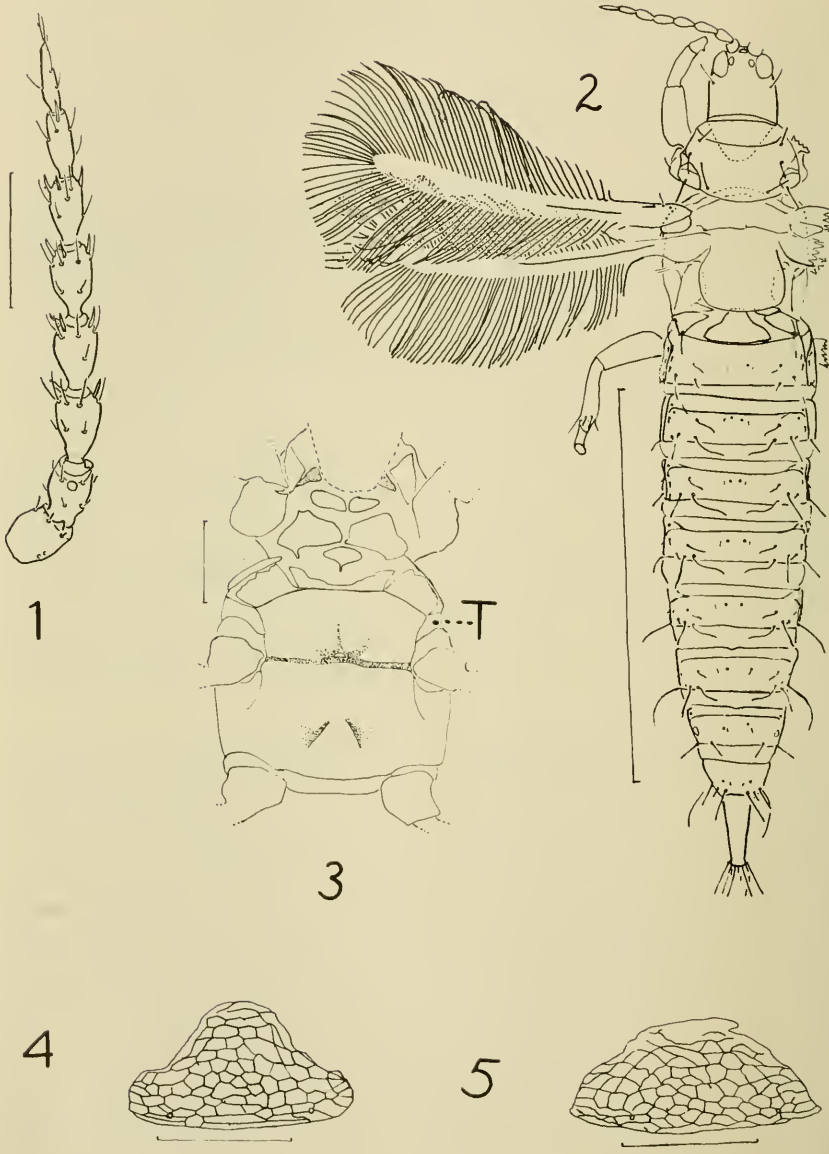
The alligatorweed thrips does not have conspicuously wide wings as other genera of Thorybothripina do, but shares their combination of a stout, *Haplothrips*-like body and glandular area on male sternum VIII. The neotropical predators that are *Haplothrips*-like and have a glandular area on male sternum VIII have wings narrowed beyond the middle and sparse, almost uniformly long cilia. The alligatorweed thrips and other thorybothripines—all of which undoubtedly are plant feeders—have thickset fringe cilia that are shorter at the wingtip than along the distal posterior margin. Alligatorweed thrips wings are normally wide and, like those of other thorybothripines, are about parallel-sided and have only two major subbasal setae.

Measurements of the head length are taken from the interantennal costa to the posterior dorsal margin. Variation in tilt of the head in different preparations unavoidably causes some inaccuracy in this measurement.

Amynothrips, n. gen.

Type-species: *Amynothrips andersoni*, n. sp.

Body (fig. 2) stout.



Figs. 1–5. *Amynothrips andersoni*, n. sp. (fig. 2, line = 1 mm; fig. 1, 3–5, line = 0.1 mm): 1, left antenna, dorsal aspect, macropterous ♀; 2, body and left appendages except mid leg, dorsal aspect, macropterous ♀, minor setae omitted; 3, thorax, ventral aspect, macropterous ♀, setae omitted (T = mesothoracic medioepisternum); 4, pelta, macropterous ♀; 5, pelta, shortwinged ♀.

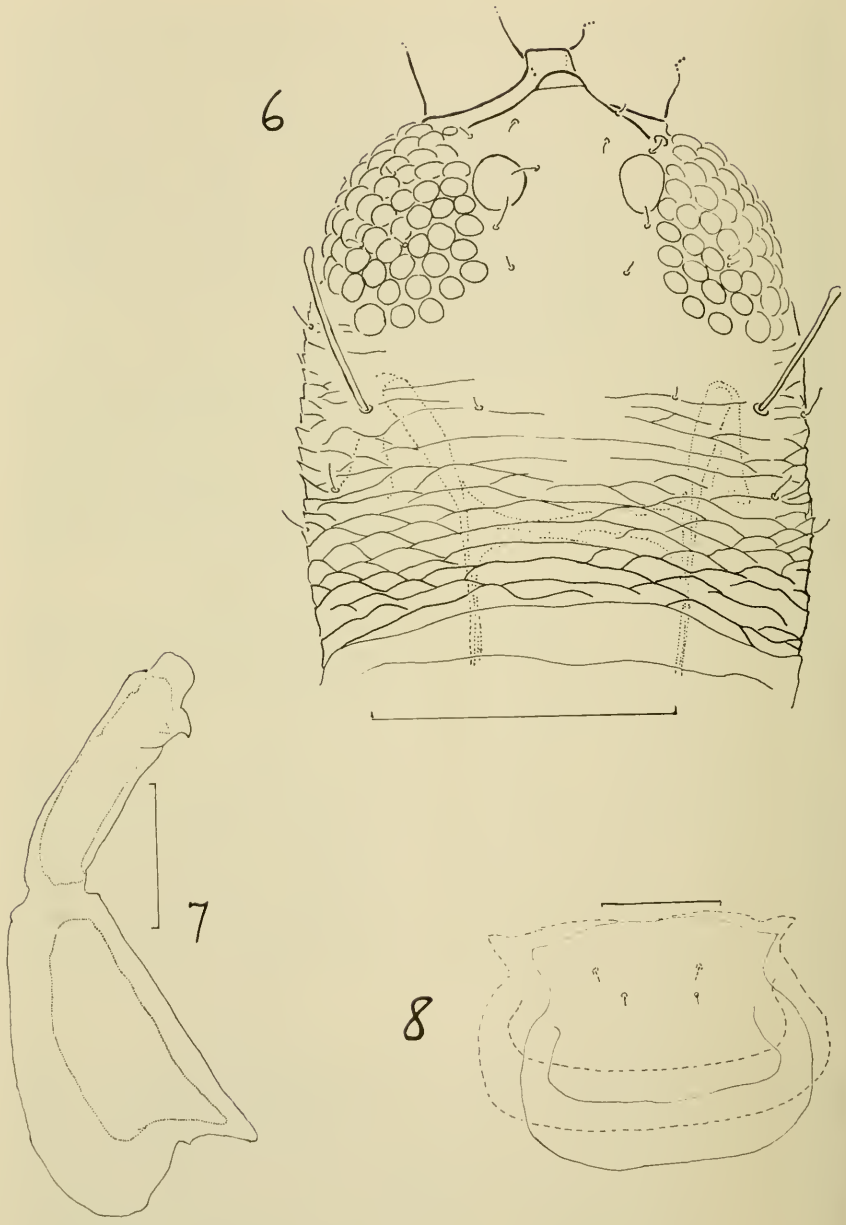
Head (fig. 6) in dorsal aspect slightly longer than wide, with sides about parallel; surface mostly smooth, with faint transverse anastomosing striae at base and sides. Frontal costa narrow, straight, distinctly produced before eyes, anterior to fore ocellus; ocellar hump moderate; ocelli present, equidistant from each other. Cheeks very slightly indented at bases of eyes, finely serrate, with a few delicate spines; basal collar bandlike, uniformly wide in mesal third, slightly narrower sublaterally. Eyes moderate in size, slightly longer on dorsal than on ventral surface; facets fine, nearly uniform in size. Postocular setae well developed. Antennae (fig. 1) 8-segmented; segments subequal, successively narrower from IV distad, and except for I narrowed or pedicellate at base; sense cones medium or small, III, 1 (1); IV, 2 (2 ± 1). Mouth cone of moderate size, rounded. Maxillary stylets slender, extending well into head; guides much shorter, delicate; bridge transparent, moderately thick.

Prothorax moderately large; pronotum smooth, about ⅔ as long as head, with sides diverging posteriorly to almost twice mesal length; epimeral suture complete. Setae in normal positions; anteromarginal pair minute; remainder more or less well developed. Prepectus (fig. 3) small. Pterothorax about as wide as abdomen. Mesonotum with faint, weakly transverse reticulation, metanotum with faint, equilateral reticulation extending from anterolateral to posteromesal portions, longer and not as wide in macropterous specimens as in shortwinged ones (fig. 8). Mesopresternum (fig. 3) entire, sometimes scarcely so; adjacent border of mesosternum straight.

Legs normal; fore leg (fig. 7) with tarsus toothed and femur more or less enlarged in both sexes. Wings (fig. 2) when fully developed about 0.09 as wide as long, almost parallel sided; middle very slightly narrowed and without convexity; fringe cilia moderately closely spaced, those at apices of wings about 0.6 as long as longest; accessories wanting. Fore wing with subbasal setae i and iv minute, ii and iii well developed, or all but iii wanting.

Abdominal tergum I with pelta (figs. 4–5) triangular, wider than long; surface sculpture distinct, irregular reticles; segment II dorsally and ventrally with faint equilateral reticulation anteriorly, smooth posteriorly; sculpture of distal segments similar but less distinct. Abdominal setae normal; subdorsal major pair on ♂ tergum IX reduced. Male sternum VIII with transverse glandular area extending across middle portion, nearly attaining lateral margins behind tergosternal muscle attachments. Tube normal, about 0.9 as long as head, very slightly smaller in shortwinged specimens than in macropterous ones; width at base about 0.4 length, at apex 0.2, very slightly greater in ♀ than in ♂. Terminal setae shorter than tube.

Amynothrips differs from other thorybothripines not only in its wing width, but also in its lack of accessory fringe cilia. No other thorybothripine is known to have reduced wings, and no other thrips is known to vary as much in wing length. (Priesner told me in personal correspondence that *Halothrips* Bournier, which is apterous, does not belong in Thorybothripina.) Though fully developed *Amynothrips* wings are normal in width for the suborder, they are narrow compared to those of other thorybothripines. The reduction in width and loss of accessory fringe cilia suggest that wings of all *Amynothrips* speci-



Figs. 6–8. *Amynothrips andersoni*, n. sp. (lines = 0.1 mm): 6, head, dorsal aspect, macropterous ♀; 7, fore legs, major and minor macropterous ♂♂; 8, metanotum, macropterous and shortwinged ♀♀.

mens seen were reduced, and the truly macropterous form should have wide, double-fringed wings. However, the ocellar and metathoracic development clearly distinguish the macropterous form.

The ocellar and metathoracic development also show that certain *Amynothrips* forms are shortwinged even though the wing reduction is minute. Ocelli of macropterous forms are almost twice as wide as eye facets, antenna IV has an additional minor sense cone on its outer side, the metanotum is at least 0.8 as long as wide, and the metatibial spine is minutely hooked. Ocelli of shortwinged forms are about as wide as eye facets, antenna IV has only the four regular sense cones, the metanotum is no more than 0.7 as long as wide, and the metatibial spine is smooth. Although the mean metanotal index of forms with ciliate or imperceptibly reduced wings is 0.66 and the mean of those with nonciliate and decidedly reduced wings is 0.63, the index in an individual shows only the probable, and not the actual wing length.

None of the specimens from Castelar, Argentina, the source of the introduced material, is fully macropterous. In order to have the name associated as closely as possible with the introduced population, I selected a shortwinged specimen as holotype. Accordingly, the holotype, a shortwinged ♀, is described first, and the shortwinged ♂ and the macropterous ♀ and ♂ afterwards, instead of the usual order of macropterous ♀, shortwinged ♀, macropterous ♂, and shortwinged ♂. Measurements in parentheses following the holotype are the mean and extremes for the shortwinged ♀ form. All measurements of other forms are the means. I use the term "shortwinged" because of the variable amount of wing reduction, in order to preserve "brachypterous" and "hemimacropterous" for their customary usage to describe the normal reduced-wing forms of thrips.

Amynothrips andersoni, n. sp.

All forms with body brown; internal pigment red, scattered throughout; basal half of tube blackish brown; ocellar crescents blackish red. Antennae brown except for segment III, which has pedicel yellow, inner margin brown, and remainder yellowish brown. Legs brown except for yellowish brown fore tarsi; fore tibiae and mid and hind tarsi lighter brown than remainder. Fully developed wings without median dark streak, usually slightly shaded brown, darkest at extreme base, slightly darker in basal ⅔ of forewing than in remainder; a few fully developed and all short wings clear beyond base.

Holotype ♀ (shortwinged): Body 2.3 mm (mean, shortwinged ♀, 2.2; extremes, shortwinged ♀, 1.8–2.5). Head length, 228 μ (211; 172–232); width, 174 μ (174; 148–201). Fore ocellus about as large as eye facets; hind ocelli a little larger. Eyes, dorsal length 53 μ, width 58 μ, least interval 50 μ, ventral length 38 μ. Postocular setae, length 35–42 μ (41; 26–55), slightly expanded and obliquely truncate, forming smooth oval; distance from eyes 30 μ (27). Antennae as in fig. 1; lengths of segments, III, 56 μ (54–61); IV, 55–57 μ (49–60); V, 59 μ (52–62); VI, 54–55 μ (50–60); VII, 49–50 μ (46–57); VIII,

57–59 μ (48–62); segment IV with sense cones 2 (2). Maxillary stylets as in fig. 6.

Pronotum, length 160 μ (151; 132–166); width, 285 μ (294; 235–359); width including coxae, 370 μ (356; 285–402). Pronotal anteromarginal setae minute or wanting; antero-angulars 29–32 μ; midlaterals 31 μ; posteromarginals 52–57 μ; epimerals 54–50 μ; tips narrowly blunt to slightly expanded, smooth. Minors scant and minute. Metanotum (fig. 8), length 178 μ (175; 144–199); width, 265 μ (274; 219–324); index (length divided by width), 0.67 (0.64; 0.54–0.69). Thoracic sterna as in fig. 3, but mesothoracic medioepisternum (Faure, 1959, p. 214) not extending as far posteriorly, coxal cavity more open than in macropterous form. Minor setae of legs scant, small; majors pointed. Fore- and hind wings present, 200–300 μ long, ciliate; subbasal setae 2, weakly developed, spatulate- or blunt-tipped. Other specimens with wings variously developed, from imperceptibly to strongly reduced, not always the same on both sides; cilia present or absent; subbasal setae 1 or 2, delicate, with tip spatulate to acuminate, usually different on left and right wings; hind wings seemingly always represented, occasionally longer than fore wings.

Pelta of holotype abdomen weakly bell-shaped, of other specimens weakly bell-shaped to semi-elliptical (fig. 5), but shorter and wider than ♂'s and macropterous ♀. Lengths and widths of abdominal segments: pelta, length, 86 μ (88; 72–98); width, 190 μ (202; 168–222); II, length, 124 μ (119; 100–135); width, 410 μ (428; 334–472); III, length, 123 μ (122; 101–140); width, 430 μ (432; 338–474); IV, length, 125 μ (123; 104–140); width, 421 μ (424; 339–461); V, length, 128 μ (124; 102–139); width, 405 μ (407; 329–442); VI, length, 125 μ (123; 104–137); width, 377 μ (378; 318–413); VII, length, 120 μ (117; 103–130); width, 325 μ (330; 275–366); VIII, length, 112 μ (111; 89–120); width, 260 μ (264; 222–290); IX, length, 95 μ (94; 85–103); width, 171 μ (171; 113–193); tube, length, 182 μ (178; 152–194); basal width, 80 μ (76; 70–82); apical width, 38 μ (38; 35–43). Lateral major setae spatulate at tip, except abdomen VII, seta ii (ventral), soft to acuminate; abdomen VIII, seta i (homologue of wing-retaining setae), narrowly blunt; and abdomen IX, seta iii (ventral), acuminate. Terminal setae 0.8 as long as tube; tips transparent for about 8 μ.

Macropterous [m] ♀, (macropterous [m] ♂; shortwinged [s] ♂): Body, ♀m (fig. 2), 2.2 mm (♂m 1.9 mm; ♂s 1.8 mm). Head, length, ♀m (fig. 6), 211 μ (♂m 200; ♂s 193); width, ♀m 174 μ (♂m 159; ♂s 160). Ocelli, ♀m♂m 1.7–2 times diameter of eye facets; ♂s about equal to eye facets. Postocular setae, length, ♀m 55 μ (♂m 48; ♂s 40); distance from eyes, 24 μ. Antennal segments (fig. 1), length, III, ♀m 54 μ (♂ms 54); IV, ♀m 54 μ (♂m 53; ♂s 51); V, ♀m 55 μ (♂m 52; ♂s 53); VI, ♀m 51 μ (♂m 48; ♂s 50); VII, ♀m 49 μ (♂m 45; ♂s 45); VIII, ♀m 53 μ (♂m 51; ♂s 52); IV with additional outer minor sense cone in ♀m♂m, not so in ♂s.

Pronotum, length, ♀m 142 μ (♂m 149; ♂s 150); width, ♀m 303 μ (♂m 279; ♂s 276); width including coxae, ♀m 355 μ (♂m 329; ♂s 328). Pronotal major setae, ♀m♂m, stronger than ♀s, with tips regularly spatulate; ♂s as in ♀s, delicate, with tips sometimes narrowly blunt. Metanotum (fig. 8), length, ♀m 214 μ (♂m 190; ♂s 152); width, ♀m 254 μ (♂m 217; ♂s 236); index, ♀m 0.84 (♂m 0.88; ♂s 0.64). Thoracic sterna, ♀m, fig. 3; ♂m similar; ♂s with mesothoracic medioepisternum shorter posteriorly. Hind tibia, ♀m♂m, with

major outer distal seta minutely hooked, shorter than mid tibial seta; ♂s, major outer distal seta pointed, longer than mid tibial seta. Wings (fig. 2), ♀m♂m, usually slightly cloudy, as if not fully extended, with more or less distinct rib or fold extending to middle of forewing, somewhat farther in hind wing; ♂s, strongly to imperceptibly reduced, hind wings usually much smaller but rarely much larger than forewings, members of a pair not necessarily similar. Cilia, ♀m♂m, smooth except those along base of adjacent fore- and hind wing margins slightly asperate, as usual in Tubulifera; ♂s, similar to m forms, reduced, or absent. Subbasal major setae, ♀m♂m, 2, with tip spatulate; ♂s, 1 spatulate, 1 pointed or absent.

Pelta (fig. 4) ♀m♂m, bell-shaped, 0.54 as long as wide; ♂s, weakly bell-shaped to semi-elliptical, 0.47 as long as wide. Lengths and widths of abdominal segments, pelta, length, ♀m 91 μ (♂m 77; ♂s 75); width, ♀m 168 μ (♂m 146; ♂s 159); II, length, ♀m 115 μ (♂m 97; ♂s 96); width, ♀m 406 μ (♂m 320; ♂s 341); III, length, ♀m 116 μ (♂m 93; ♂s 93); width, ♀m 405 μ (♂m 314; ♂s 342); IV, length, ♀m 118 μ (♂m 93; ♂s 94); width, ♀m 395 μ (♂m 302; ♂s 329); V, length, ♀m 120 μ (♂m 95; ♂s 96); width, ♀m 377 μ (♂m 385; ♂s 315); VI, length, ♀m 126 μ (♂m 96; ♂s 95); width, ♀m 350 μ (♂m 267; ♂s 296); VII, length, ♀m 118 μ (♂m 96; ♂s 93); width, ♀m 312 μ (♂m 241; ♂s 264); VIII, length, ♀m 112 μ (♂m 96; ♂s 95); width, ♀m 267 μ (♂m 204; ♂s 217); IX, length, ♀m 91 μ (♂m 89; ♂s 91); width, ♀m 174 μ (♂m 130; ♂s 135); X, length, ♀m 183 μ (♂m 169; ♂s 163); basal width, ♀m 76 μ (♂m 66; ♂s 68); apical width, ♀m 38 μ (♂m 35; ♂s 35). Lateral major setae about as in holotype, more regularly spatulate in macropterous forms than in shortwinged ones, though with the same exceptions; but ♂ of both forms with seta ii, segment IX, reduced and pointed. Male glandular area of sternum VIII occupying middle half of length, extending laterally to points of tergosternal muscle attachments and behind them to margin. Terminal setae as in holotype, 0.8 as long as tube.

Holotype ♀, 79 ♀ and 32 ♂ paratypes, all shortwinged, Argentina, Prov. de Buenos Aires, Castelar, *Alternanthera philoxeroides* (Mart.) Gris., Feb. 1965, D. M. Maddox; additional paratypes (and immatures collected with paratypes but not included in type series), *Alternanthera philoxeroides* (Mart.) Gris., as follows: Argentina: Prov. de Buenos Aires, 4 ♀♀ (26), nr. Campana, Estacion Experimental Agropecuaria del Delta, 14 Feb. 1960, G. B. Vogt #60–884; 15♀♀ 12 ♂♂ (24), Las Barrancas, upper beach of Rio de La Plata, 22 Feb. 1960, G. B. Vogt #60–861; 1 ♀ 1 ♂, San Miguel del Monte, 8 Apr. 1961, G. B. Vogt #61–1645; Prov. de Corrientes, 2 ♀♀m (9), Arroyo Riachuelo 9 km. S. of Corrientes, 11 Mar. 1960, G. B. Vogt #60–953; Prov. de Entre Rios, 1 ♀, Yaravi on Brazo Largo, 16 Feb. 1960, G. B. Vogt #60–897; Prov. de Misiones, 6 ♀♀m 6 ♂♂m (23 additional specimens, including 1 or more immatures, lost), Posadas, 21 Feb. 1961, G. B. Vogt #61–1657; Prov. de Santa Fe, 7 ♀♀m 2 ♂♂m (40), Santa Fe, Arroyo Salado nr. highway bridge just south of town, and Laguna Espejo adjacent to Rio Santa Fe, 29 Feb., 2 Mar. 1960, G. B. Vogt

#60–907. Brazil: Amazonas, 2 ♂♂m (1), Lago Careira, Ilha Careira, 25 Apr. 1960, G. B. Vogt #60–1061; Para, 8 ♀♀m 6 ♂♂m (13), Belem, 21 Apr. 1960, G. B. Vogt #60–1039; Parana, 10 ♀♀m 2 ♂♂m (50), Araucaria, on stream nr. Rio Iguacu, 20 Feb. 1962, G. B. Vogt #62–2327; 1 ♀m 2 ♂♂m (4), nr. Curitiba on Rio Iguacu, 6 Apr. 1960, G. B. Vogt #60–1002; Rio Grande do Sul, 1 ♀m 1 ♂m, 8 ♀♀ 5 ♂♂ (48), Porto Alegre, Ilha do Pavao, 29 Jan. 1960, G. B. Vogt #60–67 and #60–67a. Paraguay: 1 ♀m, 1 ♂m (21), Asuncion, drying laguna along Rio Paraguay opposite town, 24 Mar. 1960, G. B. Vogt #60–991. Uruguay: 7 ♀♀ 3 ♂♂ (48 + 15 adults), Las Piedras, Rt. 5, km. 23.2, 29 Apr. 1962, L. Carbonell Bruhn #7544; 5 ♀♀ 3 ♂♂ (1), Montevideo, 12 Mar. 1962, G. B. Vogt #62–2328. Holotype and all paratypes short-winged, except those indicated as macropterous [m].

Type depository: U. S. National Museum. Paratypes of each sex will be deposited in the Museo Argentina de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires, Argentina; Museu Nacional, Rio de Janeiro, Brazil; and with Profs. L. De Santis and A. Silveiro Guido for the Museo, Universidad Nacional de La Plata, Republica Argentina, and the Universidad de la Republica, Montevideo, Uruguay.

Reared California specimens are far paler than those found in South America. Antenna III is almost entirely yellow; IV is lighter than distal segments and sometimes partly yellow; and the fore tibia and all tarsi are yellow or pale yellowish brown. I cannot account for the difference. The eggs are white and the immatures red, with brown sclerotized areas in the larvae, especially of the second stage. This coloring is common in immatures of dark Tubulifera. Alligatorweed thrips males may have a moderate allometric development of the prothorax and fore leg (fig. 7) in major forms. The allometry is noticeable for a plant feeding species, but not so compared to that usually seen in spore feeders.

George Vogt (personal communication) often found this insect abundant on terminal growth of alligatorweed, which it damaged seriously by stunting, wrinkling, and rolling leaves. In his collections I found eggs stuck to hairs on both sides of small damaged leaves, and all stages of immatures hidden in natural and thrips-caused folds in the leaves. A. Silveiro Guido told me the thrips withstands periodical flooding of its host.

I saw additional specimens, 13 ♀♀m 1 ♂m, from *Alternanthera hassleriana* Chod., collected from drying lagunas along the Rio Paraguay opposite Asuncion, Paraguay, 23 Mar. 1960, G. B. Vogt #60–1033. Except for this single collection, I have seen the thrips only from *A. philoxeroides*. Vogt's collection data state that it attacked *hassleriana* in the same manner at it did *philoxeroides*. I have not found any differences except in size and wing development be-

tween *hassleriana* and *philoxeroides* specimens, or between specimens from the basin drained by the Amazon and neighboring rivers and those from the basin drained by rivers emptying into the Rio de la Plata. The *hassleriana* specimens are slightly smaller than *philoxeroides* specimens and invariably macropterous. The Amazon basin specimens are among the smaller *philoxeroides* specimens and also invariably macropterous. Although I omitted *hassleriana* specimens from the type series, I consider them the same species. D. M. Maddox, who conducted the feeding tests of the alligatorweed thrips in Argentina, did not find or test the thrips on *hassleriana*. According to Vogt (personal communication), the scarcity of macropterous forms on the region of the Rio de la Plata in contrast to their high incidence to the north may indicate that the southern region constitutes the major population center of *Amynothrips*. It is the most important faunal center of the other insects known to affect alligatorweed, and also the only place known in South America where alligatorweed sets seed.

The generic name is derived from a Greek work meaning *guard*. The specific name is in honor of W. H. Anderson for his work on the alligatorweed control program, and in appreciation of his help, encouragement, and good humor.

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A NEW SPECIES OF RHYNONIRMUS FROM THAILAND
(MALLOPHAGA: PHILOPTERIDAE)

K. C. EMERSON[1] *and* ROGER D. PRICE[2]

Recently Mr. Ben King sent us a large series of Mallophaga representing a new and unusual species. The form is herewith described, illustrated, and its relationship with other forms discussed.

Rhynonirmus kingi, n. sp.
(Figs. 1–3)

Male.—Length 2.46 mm. Forehead rounded and circumfasciate, without transverse dorsal clypeal suture. Marginal carina of forehead complete, dorsally and ventrally. First antennal segment greatly enlarged, without appendage. Trabeculae small. Ocular seta medium-length. Two elongated marginal temporal setae on each side with anterior seta same length as ocular seta and posterior seta almost twice as long.

Prothorax with parallel lateral margins and broadly rounded convex posterior margin; with 1 posterolateral elongated seta on each side. Pterothorax trapezoid-shaped, with posterior margin indented medially; 8 posterior dorsal pterothoracic setae on each side as shown in fig. 3. Thoracic sternal plate triangular, narrowed anteriorly, with 2 setae on each side. Legs typical of elongated forms of Ischnocera.

Tergal plates on abdominal segments II–V divided, VI indented medially, others entire. A dorsal median plate posterior to tergal plates on abdominal segments III–VI. Abdominal sternal plates entire, those on segments II–VI each with paired sensilli. Shape and chaetotaxy of abdominal segments as shown in fig. 3.

Genitalia as shown in fig. 2.

Female.—Length 2.67 mm. Head and thorax essentially as for male, except for filiform antennae and dorsal posterior margin of pterothorax which has only 6 setae on each side as in fig. 1.

Tergal plates on abdominal segments II–VII divided, others entire. Each sternal plate on abdominal segments II–VI with paired sensilli, as for the male. Shape and chaetotaxy of abdominal segments as shown in fig. 1.

Type host.—*Carpococcyx renauldi* Oustalet.

Type material.—Holotype male, allotype female, and 182 paratypes collected off the type host at Khao Soi Dao Tai, Chanthaburi, Thailand on March 24, 1966 (MAPS number 2362). The holotype and allotype will be deposited in the U. S. National Museum.

Discussion.—Heretofore, species of *Rhynonirmus* have been found only on hosts of the Charadriiformes. This species, from a ground cuckoo, again raises the question of whether the genera *Otidoecus*, *Rhynonirmus* and *Cuclotogaster* of the *Otidoecus*-complex should be

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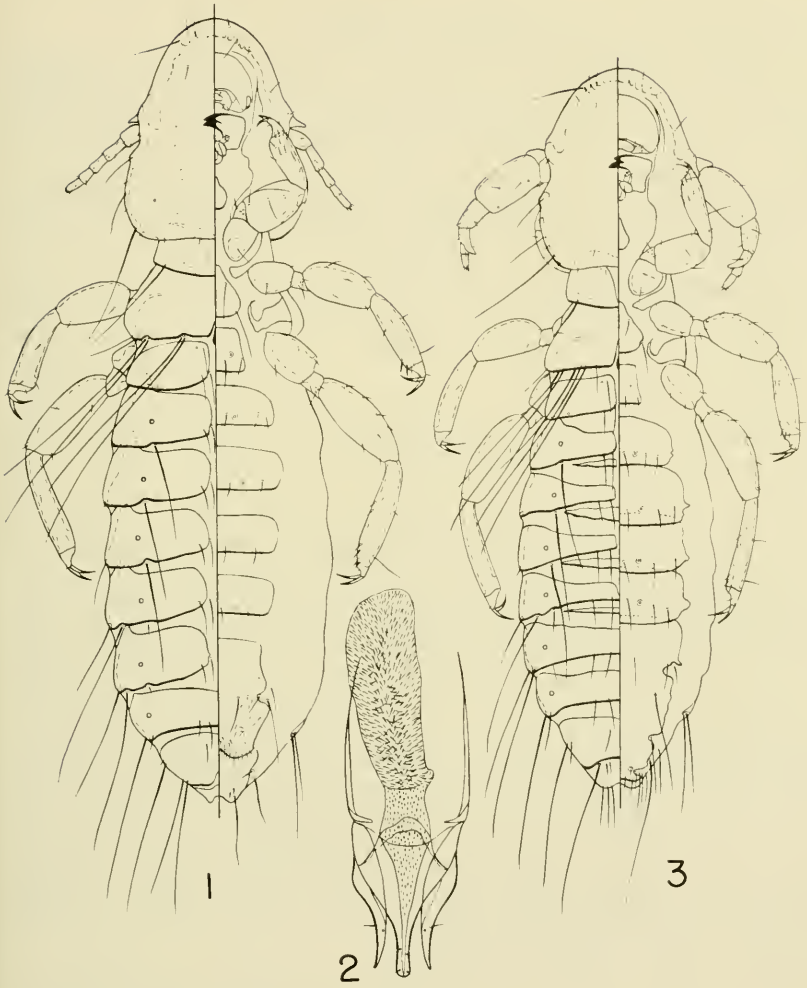

Figs. 1–3. *Rhynonirmus kingi*, n. sp.: 1, dorsal-ventral view of female; 2, male genitalia; 3, dorsal-ventral view of male.

retained as separate genera. From the evidence offered by this species, the present separation of genera must be retained until collections from other hosts have been studied.

The male genitalia of *R. kingi* are typical of those found in other species of *Rhynonirmus* as is also true for the terminal abdominal segments of the female, the antennae of both sexes, and the general chaetotaxy. For these reasons, it is considered more appropriate at

this time to include the species in *Rhynonirmus* than to erect a new monotypic genus in the *Otidoecus*-complex.

R. kingi is closest to *R. helvolus* (Burmeister) 1838 in general appearance. Anterior margin of head is pointed medially in *helvolus* and rounded in *kingi*. The paired sensilli on abdominal sternites II–VI and the absence of a transverse dorsal clypeal suture in both sexes are features of *kingi* not found in other species of *Rhynonirmus*. In addition *R. kingi* is at least 0.50 mm longer than any known species.

Reference

Clay, T. 1961. Three new species of Mallophaga (Insecta). Bull. Brit. Mus. (N. H.), Ent. 11(2):43–58.

INFORMATION PROBLEMS IN THE BIOLOGICAL SCIENCES

The Entomological Society of America and the Biological Sciences Communications Project of George Washington University are co-sponsors of a day-long round-table discussion about information problems in the biological sciences during the annual meetings of AIBS in Columbus, Ohio, September 3–7, 1968.

The meeting is being held to explore the possibility that various biological societies might cooperate to design a master plan for information storage and retrieval activities in the biological sciences. Such cooperation is viewed by many biologists as imperative, because information in biological sciences is increasing so rapidly and because the various disciplines in biology are becoming more and more interdependent. Information centers to meet the special needs of biologists then could be designed and operated under this master plan to provide for a more complete coverage of the literature, avoidance of duplication of effort, and efficient interfacing. The meeting has the support of the NAS Council on Biological Sciences Information.

So far, more than half of the adherent Societies of AIBS have expressed an interest in being represented at this discussion, and many have already appointed official delegates. Participants in a morning round-table discussion will represent Societies already actively devising means to cope with their information problems. The afternoon session will be devoted to a general "conversation" among representatives of interested organizations to air the information problems of various disciplines in biology.

Dr. Richard H. Foote, Entomology Research Division, USDA, North Building, Plant Industry Station, Beltsville, Maryland 20705, and Mr. Irvin Mohler, Biological Sciences Communication Project, Suite 700, 2000 P. Street, N.W. Washington, D.C. 20036, represent the sponsors and will be pleased to have any comment. The interested scientific public is invited to attend and to contribute to the sessions.

MOSQUITOES OF THE GENUS CULISETA IN CONNECTICUT[1]
(DIPTERA: CULICIDAE)

ROBERT C. WALLIS *and* LORING WHITMAN, *Yale Arbovirus Research Unit, Department of Epidemiology and Public Health, Yale University School of Medicine, New Haven, Connecticut 06510*[2]

Mosquitoes of the genus *Culiseta* Felt that occur in Connecticut have been considered rare and only of academic importance. However, in recent years, as members of this genus have been incriminated in the natural history of arboviruses, it has become necessary to assay the number and abundance of species present. This communication is a report of those collected, including one that has not been previously reported from the state.

Wallis (1960) discussed two species [*Culiseta melanura* (Coquillett) and *Culiseta morsitans* (Theobald)] that he found in Connecticut, and listed another [*Culiseta inornata* (Williston)] that he had not encountered but was recorded as present in the state. Studies of the biology of the former two species have been published (Wallis, 1953, 1957, 1959, 1960, 1962; Wallis and Whitman, 1967). However, no listing of other species has appeared since Mallia (1964) reported the original record of *Culiseta minnesotae* Barr in the state, from Plainville.

During 1965–1967, collections made at two locations in Connecticut yielded the following species of *Culiseta.*

1. Farmington (resting-place collections)

From 29 July through 28 September 1967, 1,053 *C. melanura* and 157 *C. morsitans* were taken here. Also found were: *C. impatiens* (Walker), 1♀, 1♂ (11/9/67), 1♂ (13/9/67), 2♀♀, 1♂ (17/9/67), 1♂ (18/9/67), 1♂ (20/9/67); *C. minnesotae*, 2♀♀ (18/9/67), 1♀ (20/9/67), 1♀ (28/9/67).

2. Simsbury (light-trap collections)

Forty ♀ *C. melanura* and 52 ♀ *C. morsitans* were collected from 31 July through 27 September 1967. The other species taken here were: *C. inornata*, 2♀♀ (31/8/65), egg rafts (10/9/65, 12/9/66, lab. reared larvae); *C. impatiens*, 2♀♀ (3/9/65); *C. minnesotae*, 1♀ (7/8/67), 1♀ (16/9/67).

Although Wallis (1959) could find *C. melanura* on only four of 25 farms where pheasants had died of eastern encephalitis between 1953 and 1959, obviously this species is not as rare as was once thought. While it does not contribute significantly to the total mosquito population and is not a particularly pestiferous species for man, it is the most abundant *Culiseta* in the state. The next most abundant species of this genus is *C. morsitans* and it cannot be considered rare, even

[1] This study was supported in part by a USPHS Research Grant from the National Institutes of Health, No. 5-RO1-GM-12362-04.

[2] The Yale Arbovirus Research Unit is supported in part by The Rockefeller Foundation.

though little is known of its biology in nature. Nor can the closely related species *C. minnesotae* be considered rare, although it is not often encountered in collections. It has been recorded only during the past several years because it was not described as a species by Barr until 1957; prior to this time it was probably identified as *C. morsitans* when encountered in collections. Both *C. inornata* and *C. impatiens,* however, still must be considered rare. The former has been listed present in the state for many years but is seldom encountered. *C. impatiens* is reported here for the first time from Connecticut.

Since the preparation of this manuscript, there has been a revision in the official classification of the subgenus *Culicella* Felt (Stone, 1967). In this revision the species *C. morsitans* as applied to North America has been deleted and is replaced by the subspecies *C. morsitans dyari* (Coquillett). Furthermore, the species *C. minnesotae* Barr has been made a subspecies of *C. silvestris* (Shingarev). However, it is felt that in a paper of this nature, the use of the older terminology is preferable pending a general acceptance of the revision by entomologists in this country.

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——— *and* **L. Whitman.** 1967. *Culiseta melanura* (Coquillett) breeding in artificial containers. J. Med. Ent. 4(3):273–274.

BOOK REVIEW

Entomology of Antarctica. Edited by J. Linsley Gressitt. Volume 10, Antarctic Research Series, American Geophysical Union. xii + 395 pp., illus. 1967. $17.00. (Available from American Geophysical Union, 2100 Pennsylvania Ave., N.W., Washington, D.C. 20037.)

At the mention of Antarctica, one's thoughts almost invariably turn to unending, barren snow and ice. This is nearly the case, but there are many small islands, peninsulas, mountainsides, and dry valleys which are snow free for at least several months of the year. Some of them support plant growth or aviaries which in turn provide the necessary organic matter to support a significant terrestrial arthropod community.

In this fine volume we have a complete summary and a major original contribution to the knowledge of the terrestrial arthropod community of Antarctica and adjacent islands. The first half of the book presents the taxonomic papers, each by a different specialist. Most of these authors are reporting mainly on collections made from 1960 on, underscoring the importance of the recent Antarctic investigations. However, continuing expeditions will necessitate further monographs.

Dr. Gressitt has contributed the introduction giving both an extensive summary of entomological exploration in the Antarctic and a zoogeographic analysis. Preston E. Hunter treats the mesostigmatid mites, Nixon Wilson the nasal mites and ticks, R. W. Strandtman the trombidiform mites, Irwin M. Newell the marine mites, and John A. Wallwork the oribatid mites. The springtails are monographed by K. A. J. Wise, the lice, both biting and sucking, by Theresa Clay and Christopher Moreby, and the midges by W. W. Wirth and Gressitt.

The second half of the book is devoted to ecological and biological papers, with Heinz Janetschek providing an extensive discussion of arthropod ecology in South Victoria Land and P. J. Tilbrook a chapter on the ecology of the marine Antarctic. In addition Janetschek contributes a detailed analysis of the growth of the springtail *Gomphiocephalus hodsoni*, Elmer E. Gless notes on the biology of the mite *Coccorhagidia gressitti*, and Murray, Orton, and Cameron notes on the flea *Glaciopsyllus antarcticus*. General ecological notes on the mites of North Victoria Land are the subject of a chapter by Gressitt and Shoup, the arthropod ecology at Palmer Station is treated by Jack Strong, the same of the Antarctic Peninsula-South Shetland-South Orkney Islands is covered by Gressitt, and the distribution of the Collembola at Cape Hallett is discussed by Wise and Shoup.

A total of 130 terrestrial species are listed from Antarctica: Acarina 67, Collembola 19, Mallophaga 37, Anoplura 4, Diptera 2, and Siphonaptera 1. The total number of species in certain regions are as follows: S. Orkneys 29, S. Shetlands 45, Antarctic Peninsula 52, S. Victoria Land 17, N. Victoria Land 15, and E. Antarctica 26.

The book contains many maps, line drawings, and photographs as well as keys to all levels. All those who cooperated in the production of this book are to be congratulated.—OLIVER S. FLINT, JR., *Department of Entomology, Smithsonian Institution, Washington, D.C. 20560.*

SUMMARY REPORTS OF SOCIETY OFFICERS FOR 1967

CORRESPONDING SECRETARY

(For the fiscal year 1 November 1966 to 31 October 1967)

Membership on 1 November 1966		492
Reductions:		
Resigned	4	
Dropped	14	
Decreased	4	
Total	22	
Increases:		
Elected to Membership	19	
Reinstated	7	
Total	26	
Membership on 31 October 1967		496
Classes of Membership:		
Dues paying	473	
Life	4	
Retired	15	
Honorary	4	
Total	496	

The membership is distributed among 44 states, the District of Columbia, 2 Territories, and 15 foreign countries.

Circulation of the Proceedings (September 1967 issue):		
States	508	
District of Columbia	89	
U. S. Possessions	9	
Foreign Countries	182	
Total		788
Distribution of the Proceedings (September 1967 issue):		
To members	479	
To subscribers	309	
Total		788

The *Proceedings* go to members and subscribers in 50 states, the District of Columbia, 2 Territories, and 45 foreign countries. Respectfully submitted, DAVID R. SMITH, *Corresponding Secretary.*

TREASURER

(For the period 1 November 1966 to 31 October 1967)

	General Fund	Special Publication Fund	Total
November 1, 1966	$ 1,601.52	$11,200.79	$12,802.31
Receipts	$ 6,000.87	$ 774.69	
Subtotal	$ 7,602.39	$11,975.48	
Expenditures	$ 4,789.18		
Balance October 31, 1967	$ 2,813.21	$11,975.48	$14,788.69

Respectfully submitted, ARTHUR K. BURDITT, JR., *Treasurer.*

CUSTODIAN

(For the period 1 November 1966 to 31 October 1967)

The value of stock sold by the Custodian's office amounted to $505.15. Of these items $111.40 was for 16 copies of the *Memoirs*, $7.00 for 4 copies of the Weld Volumes, $386.75 for complete and miscellaneous numbers of the *Proceedings*. Sales of the *Memoirs* were: No. 1, 2 copies; No. 3, 4 copies; No. 4, 5 copies; No. 5, 5 copies.

A copy of the complete, detailed report is on file with the Recording Secretary. Respectfully submitted, ROBERT L. SMILEY, *Custodian*.

EDITOR

(For the calendar year 1967)

Four numbers of the Proceedings were published in 1967. Of the pages published, 4 were devoted to advertising and 370 to scientific papers, notes, obituaries, book reviews, minutes of meetings and announcements. Eighty-five scientific papers and notes were published during the year. The Society and the Proceedings benefitted from 10 paid papers of 77½ pages. This did not cause the articles of regular contributors to be postponed. Respectfully submitted, JON L. HERRING, *Editor*

THE HOST OF STACHIELLA RETUSA MARTIS WERNECK

(MALLOPHAGA: TRICHODECTIDAE)

Ferris, in 1916 (Psyche 23:98) reported *Trichodectes retusus* found on "Numerous specimens from two individuals of *Martes* sp.?, the Pine Marten; a single specimen from *Gulo luscus* ssp.?, a wolverine (all taken at Lyell Canyon, Mariposa Co., Calif.); and a single immature specimen from a skin of *Mustela vison nesolestes* (Admiralty Is., Alaska)." In the introduction to his paper he identifies the general locality as the Yosemite National Park.

Werneck, in 1948 (Malofagos de Mamiferos, Parte I: 156, figs. 231–232) described *Stachiella retusa martis* for the specimens Ferris collected off *Martes* sp. cited above.

The University of California (Berkeley) Museum of Vertebrate Zoology has two skins, a male (#22109), and a female (#22110) with data "head of Lyell Canyon, Yosemite National Park, Tuolumne Co., 9,700 ft., California collected by G. F. Ferris on July 19, 1915." These two skins are the types of *Martes caurina sierrae* described by Grinnell and Storer in 1916 (Univ. Calif. Publ. Zool. 17:2).

Based on this evidence, it is apparent that the type host of *Stachiella retusa martis* Werneck, 1948 is *Martes caurina sierrae* Grinnell and Storer.

I wish to thank Bernard C. Nelson, Department of Parasitology, University of California (Berkeley) for his assistance in locating the host skins.—K. C. EMERSON, *2704 N. Kensington St., Arlington, Virginia 22207.*

BURROWER BUGS FROM THE GALÁPAGOS ISLANDS COLLECTED BY THE 1964 EXPEDITION OF THE GALÁPAGOS SCIENTIFIC PROJECT

(HEMIPTERA: CYDNIDAE)[1]

Two species of Cydnidae have been reported from the Galápagos Islands, *Dallasiellus murinus* (Van Duzee) and *Melanaethus subglaber* (Walker). The former species has been collected from the Islands several times. The latter is a common North American species which ranges into Mexico; the single report from "Bindlo Island" (Froeschner, 1960, Proc. U. S. Nat. Mus. 111:440) may have been based on a mislabelled specimen.

The forty-two specimens on which this report is based were collected by members of the "Galápagos International Expedition" supported in part by National Science Foundation grant GE-2370 to the University of California. They were made available for study through the kind cooperation of Drs. P. H. Arnaud, Jr., California Academy of Sciences; P. D. Ashlock, Bernice P. Bishop Museum; and R. L. Usinger, University of California.

Dallasiellus murinus (Van Duzee)

Geotomus murinus Van Duzee, 1933, Proc. Calif. Acad. Sci. 21:86.
Dallasiellus murinus; Froeschner, 1960, Proc. U. S. Nat. Mus. 111:617.

This species is now known to occur on five of the six largest islands of the Galápagos Archipelago and in Ecuador on the South American mainland. The Ecuadorian occurrence was confirmed by another specimen collected at Guayaquil, March 4, 1964.

Some of the present Galápagos material was collected at elevations as high as 300 meters. Notations on the specimens included: at lights; in litter; under bunch grass; and forest and floor. Nymphs of the fourth and fifth instars were collected with adults on February 26.

Distribution on the islands as known to me is summarized below.

Isla Isabella (= Albemarle Island): Tagus Cove, May 27, 1932 (Van Duzee 1933:26).

Isla San Cristobal (= Chatham Island): June 30, 1933 (Froeschner 1960:618).

Isla Santa Cruz (= Indefatigable Island): Academy Bay, January 26, 28, February 4, 20, 22 [29 ad]; Bella Vista, January 24, February 26 [2 ad, 5 ny]; Horneman Ranch, February 6, 16, March 8 [5 ad].

Isla Santa Maria (= Charles Island = Floreana Island): February 17 [1 ad].

Isla Fernandina (= Narborough Island): Southwest side, February 4 (mss. P. D. Ashlock).

RICHARD C. FROESCHNER, *Smithsonian Institution, Washington, D. C. 20560.*

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[1] Contribution No. 48 of the Charles Darwin Foundation for the Galápagos.

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

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> Muesebeck, C. F. W. 1963. Host relationships of the Euphorini (Hymenoptera: Braconidae). Proc. Ent. Soc. Wash. 65(4): 306.
>
> ———— and L. M. Walkley. 1951. *in* Muesebeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. Dept. Agr., Agr. Monogr. 2: 90–184.

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PROCEEDINGS

of the

ENTOMOLOGICAL SOCIETY of WASHINGTON

U.S. NATIONAL MUSEUM
WASHINGTON, D.C. 20560

PUBLISHED QUARTERLY

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(Continued on back cover)

THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

ORGANIZED MARCH 12, 1884

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Vol. 70 SEPTEMBER 1968 No. 2

THE GENUS DIARTHROPHALLUS TRÄGÅRDH, 1946. (ACARINA: DIARTHROPHALLIDAE)[1]

PRESTON E. HUNTER AND SANDRA GLOVER,[2] *Department of Entomology, University of Georgia, Athens, Georgia 30601*

Diarthrophallus was erected by Trägårdh (1946) as the type genus for his family Diarthrophallidae. The genus *Diarthrophallus* is known from the United States, Mexico and Brazil. At the present time two species, *quercus* (Pearse and Wharton), the genotype, and *duodecimpilosus* (Lombardini) are placed in this genus. As a result of the studies reported here, we are making *duodecimpilosus* a synonym of *quercus*.

Diarthrophallus Trägårdh, 1946

Trägårdh, I, 1946. Ent. Medd. 24: 371. New genus by designation. Womersley, H. 1961: Trans. Roy. Soc. S. Aust. 84: 29.

In *Diarthrophallus* the body is broadly oval, the female perigenital ring is closed posteriorly by a distinct semicircular suture and sexual dimorphism is not exhibited by modification of legs II in the male. All stages have long ciliated, capitate dorsal setae and the tectum terminates in four fingerlike, ciliated structures.

Diarthrophallus quercus (Pearse and Wharton), 1936

(Fig. 1)

Uroseius quercus Pearse and Wharton, 1936. Ecol. Monog. 6:478.

Passalobia duodecimpilosa Lombardini, 1938. Mem. Soc. Ent. Ital, 16:46 (placed in *Diarthrophallus* by Womersley, 1961, Trans. Roy. Soc. S. Aust. 84:32). **New Synonymy.**

Diarthrophallus quercus (Pearse and Wharton), 1936: Trägårdh, 1946. Ent. Medd. 24:371.

Diarthrophallus similus Trägårdh, 1946. Ent. Medd. 24:380 (made a synonym of *P. duodecimpilosa* Lomb. by Womersley, 1961, Trans. Roy. Soc. S. Aust. 84:32).

Lombardini (1938) described *Passalobia duodecimpilosa* from a single nymph taken from under the elytra of a passalid beetle from

[1]University of Georgia College of Agriculture Experiment Stations, Journal Series Paper Number 109, College Station, Athens. Partially supported by the National Science Foundation, Grant No. GB-3414.

[2]Associate professor and graduate student, respectively.

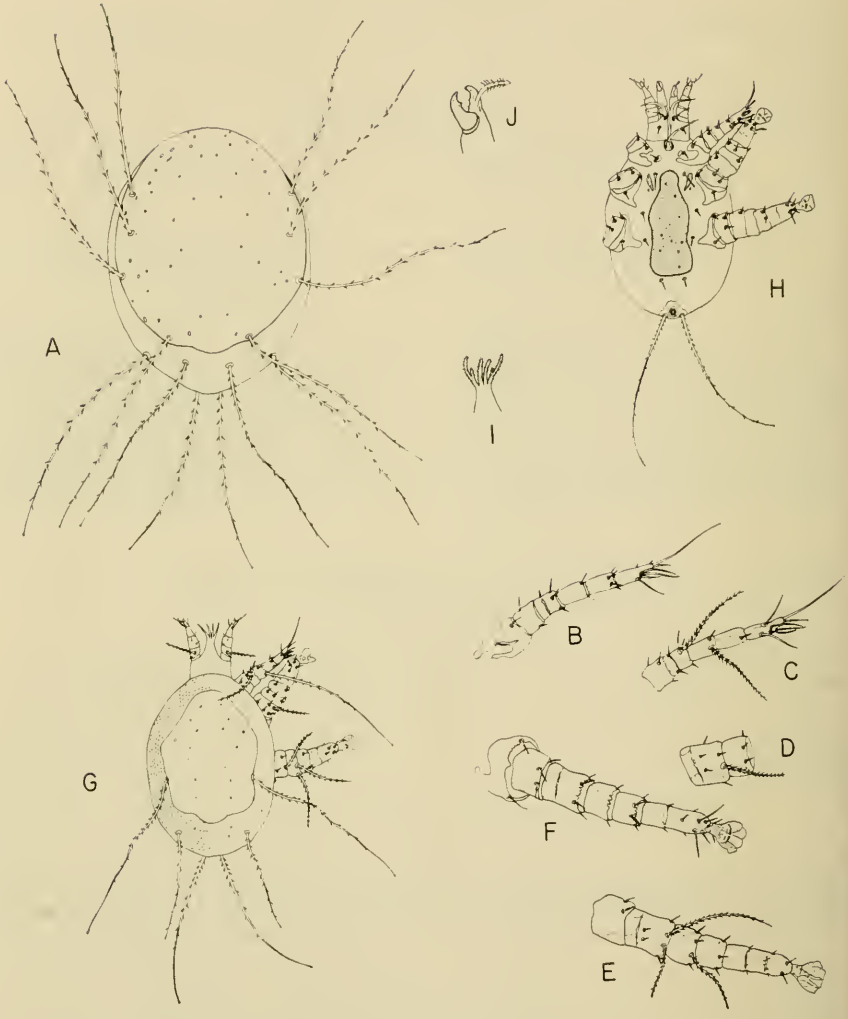

Fig. 1. *Diarthrophallus quercus* (Pearse and Wharton). Female: A, dorsum; B, ventral view of leg I; C, dorsal view of leg I; D, dorsal view of femur and genu of leg II; E, dorsal view of leg III; F, ventral view of leg IV. Larva: G, dorsum; H, venter; I, tectum; J, chelicera.

Brazil. Later Trägårdh (1946) described *Diarthrophallus similus* from a single nymph from a passalid, *Proculus goryi*, collected in Mexico. Womersley (1961) compared nymphs taken from passalid beetles in Maryland, U.S.A. with the specimen of *Passalobia duo-*

Table 1. Leg chaetotaxy formulae for deutonymph-adults of *Diarthrophallus quercus* (P. & W.). Only the total number of setae is given for the tarsi.

Leg	Coxa	Trochanter	Femur	Genu	Tibia	Tarsus
	0	10	21	11	01	
I	0—0	1—1	1—1	1—1	1—1	7 + tine
	2	00	11	00	11	
	0	00	22	11	01	
II	0—0	1—1	1—1	1—1	1—1	13
	2	11	11	00	11	
	0	10	22	11	01	
III	0—0	1—0	1—1	1—1	1—1	13
	2	11	11	00	11	
	0	11	22	11	01	
IV	0—0	1—0	1—1	1—1	1—1	13
	1	11	11	00	11	

decimpilosus and with the description of *D. similus*, and concluded that all were the same species. Based on this Womersley made *similus* a synonym of *duodecimpilosa* and at the same time placed *duodecimpilosa* in the genus *Diarthrophallus*, changing the species name ending to "us." Only the nymphal stage of *duodecimpilosus* is known and this is recognized by having five long barbed dorsal setae whereas *quercus*, the only other *Diarthrophallus* species, has six such setae.

We have a long series of *D. quercus* from the passalid beetle, *Popilius disjunctus* (Illiger), from Georgia, United States. A number of nymphs agree with the description of *D. duodecimpilosus* given by Womerlsey (undoubtly Womersley's material from Maryland came from this same host species as this is the only passalid species in the eastern U. S.). Our series also contains nymphs which agree with the description of *quercus*. Detail study of these two nymphs have convinced us that *duodecimpilosus* is the protonymphal stage of *quercus* making *duodecimpilosus* a synonym of *quercus*. The two nymphal stages may be separated, among other characters, by the protonymph having a smaller ventral plate, four pairs of ventral setae (none on the plate) and five pairs of long dorsal setae; in contrast the deutonymph has five pairs of ventral setae (one or more on the ventral plate) and six pairs of long dorsal setae.

The dorsal chaetotaxy of the deutonymph is the same as that of the adults. One pair of setae is added to the protonymphal pattern in the deutonymph-adult stage. Pits, apparently the remanents of setal bases, are present in the dorsal plate and can be correlated to some extent with the general mesostigmata chaetotaxy pattern.

The formulae for the deutonymph-adult leg chaetotaxy for *D. quercus* is given in table 1. Legs I, III and a part of II are illustrated (fig. 1B-F) to show the type and relative lengths of the setae. The type and location of setae on leg IV are the same as that shown for leg III. Chaetotaxy of legs II and III is the same except for the femur and genu, differences in these segments as follows: femur II with one heavy, barbed dorsal seta, III with two such setae; dorsum of genu II with only short simple setae, III with one short simple seta and one heavy barbed seta. Tarsi II–IV each bear a large membranous caruncle and ventrally on the caruncle a thickened ridgelike area in the shape of claws. Tarsus I bears a dorsal posterior three-tined clawlike structure.

The leg chaetotaxy of the protonymph is the same as that of the deutonymph-adult except for the absence of the following setae: trochanter IV *pd*-1 missing; femur II and III *pv*-1 missing, IV *av*-1 and *pv*-1 missing; tarsi II–IV each with only 12 setae.

Larval Description

Except for the larva which is described and illustrated here, all stages of *quercus* have been described and illustrated by previous authors.

LARVA. Idiosoma 297μ long, 207μ wide. (Measurements are the average of 4 specimens.) *Dorsum* (fig. 1G). Dorsal plate entire, with general shape of body, not extending to margins of body; some pits in general positions of normal mesostigmata chaetotaxy. Dorsum with 2 pairs of setae; setae long and tapering, strongly spined on the basal half; anterior pair 340μ long, arising from edge of plate above coxae III, ending in a small but distinct knob at tip; 2nd pair 195μ long, without knobbed tip, arising from integument. *Venter* (fig. 1H). Ventral plate 201μ long, 85μ at greatest width; shape as shown; surface stippled, without reticulations. Endopodal plated II present, 1 pair of pores in integument near posterior margin of each endopodal plate. Integument bearing 4 pairs of setae, first pair longest; setae positioned as illustrated. Anal plate bearing 1 pair of tapering spined setae, 279μ long; knobbed at tip. Peritreme and peritremal plate absent. Tritosternum with a pair of fleshy, ciliated setae arising from tritosternal base. *Legs.* Tarsus I bearing 2 terminal simple setae, anterior one twice length of posterior seta: tarsus II and III with membranous caruncle, claws absent, thickened ridges in middle giving appearance of claws. Leg setae simple except for following: Femora I, II and III each bearing a heavy, spined dorsal seta; genu III bearing 2 heavy, spined dorsal seta; dorsum of genu I with heavy, spined capitate seta 266μ long. Lengths, including coxa and caruncle, as follows: I, 137μ; II, 200μ; III, 200μ. *Gnathosoma.* Ventrally 2 pairs of simple setae positioned as shown; corniculi extending to distal margin of femur. Tectum (fig 1I) with 4 anteriorly directed fingerlike ciliated processes of about equal length, midway of their length each lateral process gives off a short ciliated fingerlike structure medially. Palps typical for genus; spined, heavy seta on dorsum of femur, other setae simple and short except for 2 longer setae at terminal end of tibia and 1 longer seta on tarsus. Chelicera chelate; movable digit with 1 tooth, fixed with 2 teeth and a fringed, scooplike excrescence (Fig. 1J).

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Womersley, H. 1961. On the family Diarthrophallidae (Acarina-Mesostigmata-Monogynaspida) with particular reference to the genus *Passalobia* Lombardini 1926. Trans. Roy. Soc. S. Aust. 84:27–44.

DEMOGRAPHY OF THE DAMSELFLY, ARGIA PLANA CALVERT[1]
(ODONATA: COENAGRIIDAE)

GEORGE H. BICK[2] *and* JUANDA C. BICK, *Saint Mary's College, Notre Dame, Indiana 46556*

This paper, part of a general study[3] of reproductive behavior in the suborder Zygoptera, adds demographic data for *Argia plana* Calvert to our earlier information on *Lestes disjunctus australis* Walker (Bick and Bick, 1961), *Enallagma civile* (Hagen) (Bick and Bick, 1963), and *Argia apicalis* (Say) (Bick and Bick, 1965).

All work was done in the field during June and July, 1964, along a 474-foot length of Cowan Creek, a small stream 2.5 miles west of the University of Oklahoma Biological Station in southern Oklahoma. We previously (1958) described salient ecological features of this Creek. The daily records, obtained under trying field conditions, would have been impossible without the appreciated assistance of Diane Sulzbach Pexa.[4]

Mature males (143) and females (143) were individually marked at irregular intervals between June 8 and July 19, and marked individuals were present each day after June 8. We studied the population daily for 41 days between 1200 and 1400 hours, and on two days continuously between 0800 and 1600. On every visit we tallied all individuals at water, both marked and unmarked, males, females, and pairs. Techniques and methods of analysis are as in our previous studies.

Seasonal.—Numbers of mature individuals increased irregularly from 56 on June 8 to a maximum of 144 on June 20, and thereafter very gradually and irregularly decreased to 45 on July 19. However, since tenerals and last instar exuviae were noted throughout the study, and

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[1]Immediate publication secured by full payment of page charges—Editor.
[2]Visiting Professor, University of Oklahoma Biological Station.
[3]Supported by research grant GM–10155, U. S. Public Health Service.
[4]Field assistant, supported by U. S. P. H. S. Grant to senior author.

since 66 last instar exuviae were collected on July 27, we consider *Argia plana* a summer species with a diffuse emergence period.

Preponderance of males at water.—Among the 2700 records of both marked and unmarked individuals, 51% were for unpaired males, 24% males in tandem, 24% females in tandem, and only 1% were for unpaired females. Because males at water always outnumbered females approximately 3 to 1, each female was seized immediately when she arrived, and because each female quickly left after tandem oviposition, records of unpaired females at water were exceptional.

The preponderance of males at water reflects differential activity of the sexes rather than a true sex ratio at emergence. On ten random days between June 17 and July 27, we searched, with equivalent effort each day, the entire length of the study area for last instar exuviae. Of the 218 found, 50.5% were males. Although the 40-day span was not the entire emergence period, and although the total number of exuviae was small, we record the ratio because so little information is available on the sex ratio at emergence for the Zygoptera. From field collections of exuviae, Corbet (1952) reports 63% males in *Pyrrhosoma nymphula* (Sulzer), and we report 45% in *L. d. australis*. From laboratory rearings, Johnson (1964) reports 43% males in *Enallagma praevarum* (Hagen).

Diurnal pattern of activity.—The earliest males arrived at the Creek at 0900 hours, but the first pairing was not until 1100 when the first females appeared. Pairing was at a maximum between 1200 and 1300 and declined thereafter. The last pairs separated around 1600, after which nearly all individuals quickly left water. Numerous observations show that most zygopteran inhabitants of sunlit ponds reach maximum numbers and activity near noon. However, the pond species *L. d. australis* was most abundant and most active in the late afternoon. In contrast, the stream species *Hetaerina americana* (Fabricius) (Bick and Bick, 1958) was abundant during all daylight hours, whereas *A. plana*, also a creek species, reached maximum numbers and activity at midday. We conclude that the basic diurnal pattern of activity is species specific and not drastically altered by the habitat. In spite of the dense shade of Cowan Creek, the diurnal activity of *plana* was essentially the same as species of fully sunlit ponds.

Movement and recovery.—There were very few recoveries of mature *plana* individuals upstream, downstream, or on either side of the study area. When we extended the daily search for marked individuals 30 yards upstream and downstream, we found that only 16% of all recoveries were beyond the study area and most of these were within the first 10 adjacent feet. In addition, our daily approach to the Creek involved a long walk, during which we saw very few individuals. No female was seen until we were within 100 feet of the

Creek, no male until 60 feet. Thus, as in *Argia moesta* (Hagen) (Borror, 1934), movement of *Argia plana* was slight in any direction away from the study area.

Although the movement of recovered individuals was slight, many *plana* individuals, particularly females, were not recovered at all after marking. The lower female recovery (♀, 51%; ♂, 72%, table 1) suggests a greater female tendency to leave the study area permanently and perhaps to colonize new habitats.

Corbet (1963) states that in topographically isolated streams, dispersal must be considered a handicap, and he lists several species which remain near such habitats. *Argia plana* is limited to shady spring-fed creeks, such as Cowan, and the per cent recovery of females (51) was higher than that of either *civile* (27) or *apicalis* (40) females. The latter two species are locally abundant at a diversity of habitats. We first thought that the reduced dispersal of *plana* females might be an expected concomitant of isolated stream life, as in the species mentioned by Corbet, and that this tendency was reinforced by the high confining walls of the Creek. Then we realized that our per cent recovery for females of *L. d. australis*, a species found locally only in particular kinds of exposed ponds, was also high (58). We hypothesize that some survival mechanism reduces to some extent the wandering of mature females of any species, such as *plana* and *australis*, which is ecologically restricted.

Longevity.—The intervals between marking and final recovery are actually the minimum reproductive spans, since all individuals were mature when marked. For convenience, we designate these intervals as age. Table 1 shows the considerable individual variation in age and the absence of a large number of males or females in any one particular age. These conditions characterize populations whose emergence is diffuse and whose age is heterogeneous.

Males of *plana* outlived females: maximum age for males was 40 days, for females 36; mean age for males was 10.9 days, for females 7.7 (table 1). Although male-female differences in mean age were recorded for *Pyrrhosoma nymphula* (Corbet, 1952), and *Argia apicalis*, as well as for *plana*, such is not always the case. In *L. d. australis*, *E. civile*, and in E. *praevarum* (Johnson, 1964) the minimum reproductive ages of both sexes were quite similar.

Predation accounted for a loss of 36 *plana* individuals of which a surprisingly large number (29) were mature. The high predation on males (25♂, 4♀) undoubtedly reflects the greater male abundance at water. Spiders, particularly their numerous webs, caused the greatest loss (14), followed by robber flies (7 mature, 1 teneral), *Archilestes grandis* Rambur (4 mature, 1 teneral), *Hetaerina americana* (5 tenerals), tiger beetle larvae (3), *Argia moesta* (1 mature). Intraspecific predation was not recorded. *H. americana* preyed only

Table 1. Number of days lived, days at water, and days mating based on 103 recoveries (72%) of 143 marked males and on 73 recoveries (51%) of 143 marked females.

	Survival after marking		Frequency at water		Frequency of mating	
Days	♂	♀	♂	♀	♂	♀
0	—	—	—	1	45	4
1	7	13	31	39	40	41
2	9	5	14	20	9	17
3	3	7	16	6	6	6
4	8	3	14	3	2	2
5	6	4	7	3	0	2
6	8	11	6	1	1	1
7	2	3	6			
8	6	2	3			
9	2	3	0			
10	3	2	3			
11	4	4	1			
12	3	3	0			
13	6	3	1			
14	4	1	0			
15	0	1	1			
16	5	1				
17	5	1				
18	2	0				
19	3	1				
20	6	1				
21	4	1				
22	0	0				
23	1	0				
24	2	0				
25	0	0				
26	1	1				
27	0	0				
28	0	0				
29	0	0				
30	2	0				
33	0	1				
36	0	1				
40	1	0				
Total individuals	103	73	103	73	103	73
Total days	1127	562	369	130	90	117
Mean days	10.9	7.7	3.6	1.8	0.9	1.6

on tenerals of *plana*, although large numbers of mature individuals of both species occurred side by side.

Days at water.—As in *australis*, *civile*, and *apicalis*, neither males nor females of *plana* returned *en masse* to water daily, and males returned more frequently than females. Males were not at the Creek each day of their 10.9 reproductive span, but on a mean of 3.6 days; females not on 7.7 days, but only on 1.8 (table 1). The appearance of

62% of the males but only 29% of the females on at least two consecutive days further indicates a more consistent male return.

The regularity of return varied not only between the sexes but also among different individuals of the same sex, and during the reproductive span of the same individual. There was no definite schedule of return. This variation can be shown best by giving the daily record of occurrence for each of the 103 recovered males and for each of the 73 females. Since this is impractical, table 2 shows the daily record for each male and female of approximately mean age. Even this limited number makes apparent the irregularity of return.

The duration of the female's absence would seem to be correlated with the time required for maturation of successive batches of eggs. To determine if this were so, we checked the 47 instances of repeat ovipositions, exclusive of the disturbed ones on the marking day. Most (16) records were on the third day after a previous oviposition, but only the complete listing of the number of records for days 1–16 can show the variation involved. These are: 0, 6, 16, 6, 5, 1, 3, 2, 2, 3, 1, 0, 0, 1, 0, 1. The variation in regularity of return among different females and even during the reproductive span of the same female suggests that the time required for maturation of successive batches of eggs does not by itself determine the duration of absence from water.

Mating frequency.—Mating more than once on the same day was rare; no male and only two females did so. The scarcity of females at water, their avoidance of second seizures, and the lengthy period in tandem combined to account for the very few records of second matings during the same day. Since so few individuals mated more than once in a day, the total number of days on which any individual mated is considered equivalent to its total number of matings.

Because more males than females were recovered, and because males lived longer and were more frequent at water than females, the potential number of male matings in the population was much greater than that of females. However, this male potential was not realized; many could not mate or mated infrequently because of female scarcity at water. Table 1 shows that almost half of the males that came to water did not mate during their reproductive spans whereas almost all females mated. The oldest male lived 40 days and was at water on five without mating; in contrast, the oldest female lived 36 days, was at water on five and mated on all five days. Mating failure was particularly striking among certain males persistent at water: each of three were at the Creek on eight days without mating; one was at water on 12 consecutive days without mating. Every female present on consecutive days mated.

When all individuals are considered, including the many males which did not mate, the mean number of mating days for recovered females was 1.6, for recovered males, 0.9 (table 1). However, if only

Table 2. Daily records of presence at water (—) and mating (m) of individuals of approximately mean age.

Marking Day	Days after marking													Post-marking record		
	1	2	3	4	5	6	7	8	9	10	11	12	13	Age	Days at water	Days mating
							Males									
m	—		—						—					9	3	0
m	m						—		m					9	3	2
m			—	—	—	—	—		—	m				10	7	1
m	—			—	—			—		—				10	5	0
m	m			m						—				10	3	2
m	—		—						—		—			11	4	0
m	—										—			11	2	0
m					—			—			—			11	3	0
—	m	m		—							—			11	4	2
m		—	—	—			—	—	—	—		—		12	8	0
m	—		—	m		—	m		—			m		12	7	3
—												m		12	1	1
m		—	—		—	m	—				—		—	13	7	1
m	—	—			—	m			—				—	13	6	1
m											m	—	—	13	3	1
m													m	13	1	1
m			—		m	—	—						m	13	5	2
m		m											—	13	2	1
							Females									
m	—	m				m								6	3	2
m						m								6	1	1
m						m								6	1	1
m						m								6	1	1
m		m				m								6	2	2
m			m			m								6	2	2
m		m		m		m								6	3	3
m				m		m								6	2	2
m	m					—								6	2	1
m			m			m								6	2	2
m							m							7	1	1
m							m							7	1	1
—			m				m							7	2	2
m				m				m						8	2	2
m									m					9	1	1
m			—						m					9	2	1
m		—							m					9	2	1

the breeders are considered, 58 males mated 90 times and 69 females 117, i.e., 1.5 and 1.7 matings per male and female respectively. This similar male-female mating success holds for the other species which we studied: *L. d. australis* (2.3♂, 2.1♀), *E. civile* (1.3, 1.2), *A. apicalis* (1.6, 1.6). We believe that the loss to the study population of many more females than males is compensated for primarily by the many males which thereby cannot obtain mates, and that this results in an almost equal number of matings per sex among the

breeders. In contrast, Johnson (1964) using different sampling techniques, reports an unequal male (3)—female (2) mating performance for *E. praevarum*.

During the two days when hourly records of matings were recorded, only four marked males and four marked females mated with each other, the rest mated with unmarked individuals. Data for these matings agree with the seasonal data outlined above. Many more marked males (45) than marked females (15) were present at water. Consequently, only a few males (11), but almost all females (13) mated. The male breeders mated on 15 hours, the females on 17, or 1.4 hours per male, 1.3 per female. Thus, hourly as well as seasonal data gave an equal male-female mating success among breeding individuals.

The similar male-female mating success among the breeders is associated with the large number of mature females which leave the study population and the resulting failure of many males to mate. This wastage of a large number of genes by non-mating males, who nevertheless use the population's food and space, seems inefficient. We first thought that this might be a mechanism for checking population size whereby a large population results in a rapid dispersal of females and in turn a larger number of males unable to obtain mates. However, our daily records show a positive correlation between total population size and number of matings. If either males or females of *plana* react to high population density by greater dispersal, our data do not show it. We can only conclude that even though the population under consideration is disadvantaged by the loss of so many male genes, the species receives compensation as a result of many mature females leaving the population and presumably colonizing new areas.

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THE HOST AND PRESENT STATUS OF ALYSIA RIDIBUNDA SAY IN MISSOURI[1, 2]

(HYMENOPTERA: BRACONIDAE)

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Following the spread of the face fly, *Musca autumnalis* De Geer, to Missouri in 1960, research was begun to study the biology and ecology of this species in Missouri. Particular emphasis was placed on the parasites and predators which help suppress populations of the face fly and other flies in the field. Among the parasites found associated with bovine manure in Missouri was a braconid, *Alysia ridibunda*.

Thomas Say first described *A. ridibunda* in 1829. His description was based on a single male specimen collected in Indiana. Howard (1900) reported *A. ridibunda* from human excrement and stated that this species was eagerly searching for the larvae of *Ravinia derelicta* (Walker) (= *Helicobia quadrisetosa* Coquillett). Lindquist (1932) reported *A. ridibunda* as a parasite of blowflies in southern New Mexico and Arizona, and Roberts (1935) stated that he had successfully reared *A. ridibunda* from several species of necrophilous flies in the laboratory at Uvalde, Texas. *Sarcophaga* was listed as the preferred host. Lindquist (1940) reported introducing *A. ridibunda* into Uvalde County, Texas by mass rearing and release of the parasite. In tests designed to determine the host preference of the parasite, he found that *Sarcophaga* was the preferred host with 80.9% emergence of *A. ridibunda* from 6,553 *Sarcophaga* larvae. Only 10.4% emergence of *A. ridibunda* was reported from 4,791 *Lucilia* larvae.

In Missouri, Cates (1964) reported *A. ridibunda* parasitizing larvae found in cow manure. He recovered *A. ridibunda* once from *Ravinia querula* (Walker) and once from an unknown host. Thomas (1967) reported recovering *A. ridibunda* once from the face fly, *M. autumnalis*, and conducted tests in the laboratory to determine the effects of *A. ridibunda* on face fly larvae. He reported a high rate of mortality in early-instar face fly larvae when the latter were exposed to *A. ridibunda* in a cage. Thomas further reported that mortality to face fly larvae caused by *A. ridibunda* was not only a laboratory phenomenon, but that it also occurred in the field. Dead face fly larvae were found on the surface of field manure several times during the summer of 1966. First-instar larvae of *A. ridibunda* were dissected from several of these larvae by the junior author.

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[2]Contribution from the Missouri Agricultural Experiment Station. Journal Series number 5396.

[3]Graduate Assistant and Professor, respectively.

Procedures and Results

Collections from decaying meat.—During 1966, under the belief that *A. ridibunda* parasitized blowfly larvae, meat baits were exposed in the field to induce blowfly oviposition and subsequent attraction of parasites. The baits were exposed in one-gallon salad dressing jars filled with two inches of moist soil for larval pupation, and were capped with lids of ¼ inch mesh hardware cloth. Eight baits, consisting of pork livers or kidneys were exposed weekly. At the end of seven days, all larvae reared in the baits were collected, brought to the laboratory, and analyzed for emerging flies and parasites. *A. ridibunda,* however, was not recovered from any necrophilous flies.

In 1967, meat baits were again exposed in the field. Six baits of two different sizes were exposed each week. Three were exposed in the same jars used the previous year, and three four-ounce baits were exposed in pint mason jars filled with one inch of moist soil. These small jars were wired to wooden shelters which were fastened to metal fence posts five feet above the ground to protect them from animals. Once again, *A. ridibunda* was not found to parasitize necrophilous flies.

Collections from field manure.—In 1967, cow manure was also examined as a possible source of the host of *A. ridibunda.* Weekly trips were made to the field to search for fresh cow manure. Manure in shade was preferred because most observations of *A. ridibunda* had been made on manure in loafing sites and other areas offering shade to cattle. It was believed that such manure would increase the chances of recovering the host of *A. ridibunda.* The manure, once found, was marked and left in the field for four days. This permitted flies to oviposit on the manure and gave parasites time to visit the manure in search of hosts. At the end of the four days, the manure was removed from the ground, placed in large enamel pans filled with one inch of moist soil and brought to the laboratory. When all larvae had completed development and pupated, they were separated by species, counted, and placed in labeled Petri dishes. The Petri dishes were kept under observation for one month and emergence of flies and parasites recorded. During this study, *A. ridibunda* was recovered from *Ravinia assidua* (Walker). This species was the only host recorded for *A. ridibunda* during the investigation. The average seasonal parasitism was 11.9%, based on 38 recoveries of *A. ridibunda* from 320 *R. assidua.* The highest parasitism of *R. assidua* was recorded from 69 larvae collected on June 22. Nineteen (26%) of the resulting puparia were parasitized by *A. ridibunda.* The lowest recorded parasitism occurred on August 25 when 143 *R. assidua* were collected. Only 10 were parasitized by *A. ridibunda.* The incidence of parasitism over the season was 50%. Less than 25% of all parasites recovered actually emerged from the host under laboratory conditions where

Table 1. Parasitism of *Ravinia assidua* (Walker) by three species of parasites in central Missouri, 1967.

Date	Number of puparia	Number of flies emerged	Parasite species			Total percent parasitism
			Alysia ridibunda	*Aphaereta pallipes*	*Aleochara bimaculata*	
6/13	20	14	15.0	0.0	0.0	15.0
6/22	69	40	26.1	2.9	0.0	29.0
7/6	4	4	0.0	0.0	0.0	0.0
7/15	25	22	12.0	0.0	0.0	12.0
7/21	38	29	7.9	13.2	0.0	21.1
7/27	8	5	0.0	37.5	0.0	37.5
8/25	143	72	7.0	27.3	5.6	39.9
9/13	7	3	0.0	42.9	0.0	42.9
9/28	1	0	0.0	0.0	0.0	0.0
10/4	5	0	0.0	40.0	60.0	100.0
Total	320	189	11.9	16.9	3.4	32.2

the temperature varied from 70 to 76 degrees F. and relative humidity was not controlled. Most of the parasites had died during the pupal stage and had to be dissected from the host puparia. Under field conditions, bucoprophilous fly larvae pupate in soil where the humidity is generally higher than laboratory air and is relatively constant. The change from field conditions to laboratory conditions may have had an adverse effect on *A. ridibunda* during the developmental period. *Aphaereta pallipes* (Say) and *Aleochara bimaculata* (Gravenhorst) also used *R. assidua* as a host and may have limited the availability of *R. assidua* to parasitism by *A. ridibunda*. Table 1 shows parasitism of *R. assidua* by these three species of parasites.

Field observations.—*A. ridibunda* appears in the field at the end of the first week of June in central Missouri. The parasite was first observed in the field on June 10, 1966, and on June 7 the following year. *A. ridibunda* is active in the field from June to October, and specimens have been collected as late as October 10 in central Missouri. Activity of the parasite appears to end with cooler weather, probably after the first frost. This species probably overwinters as an immature form in the puparium of its host. Otherwise the adults would be expected to appear in the field earlier in the spring. Field observations showed that *A. ridibunda* spends considerable time searching for hosts. This species was observed on many occasions searching the manure, continually probing the surface with the ovipositor, sometimes for two hours or more with little interruption. *A. ridibunda* was never observed in association with decaying meat and appeared to have little interest in this medium when adults were placed on meat in the laboratory. Lindquist (1940) stated that *A. ridibunda* at Uvalde, Texas was never observed on cow manure and appeared to have little interest in larvae living in dung when confined in cages.

Present status of Alysia spp.—Because *A. ridibunda* in Missouri did not occupy the same ecological niche as the species reported as *A. ridibunda* by Lindquist (1940), the status of specimens referable to *A. ridibunda* was investigated. In December, 1966, a series of 39 specimens collected in the Missouri studies was sent to the Systematic Entomology Laboratory of the USDA in Beltsville, Maryland for determination. They were identified as *Alysia* n. sp. near *ridibunda* Say, a species very similar to *A. ridibunda*. The determination was made by P. M. Marsh and C. F. W. Muesebeck. However, further correspondence with Marsh in November, 1967 revealed that the 1966 determination was in error and that specimens from Missouri were *Alysia ridibunda* Say. The specimens in Texas reported on by Lindquist and Roberts were a distinct, but closely related species, recently described as *A. cariosa* by Marsh (1968). Specimens in the National Museum Collection under the name *ridibunda* were found to be a mixture of the two species and many of the determinations made previously from these museum specimens are incorrect. Refer to Marsh (1968) for distinguishing the two species. According to Marsh, it would appear that all literature references to *A. ridibunda* as a parasite of carrion-infesting flies are not that species, but that all references to *A. ridibunda* as a parasite of dung-feeding flies are actually *ridibunda*. Hence, Howard (1900), Cates (1964), and Thomas (1967) were referring to *Alysia ridibunda* Say, while Lindquist (1932, 1940) and Roberts (1935) were referring to *A. cariosa* Marsh.

State records for *A. ridibunda* in the National Museum Collection include the following: Missouri, Virginia, Maryland, District of Columbia, Arkansas, Georgia, Kansas, New Jersey, Illinois, Pennsylvania, Texas, and West Virginia. *A. cariosa* Marsh is represented by specimens from Texas and Arizona. There are also two specimens of *A. ridibunda* from Virginia reared from *Ravinia assidua*.

Summary

During 1966 and 1967, larvae of necrophilous and bucoprophilous muscoid Diptera were collected to determine the host of *Alysia ridibunda* Say in Missouri. Although Lindquist (1932) had reported *A. ridibunda* as a blowfly parasite in the southwestern United States, this species was not recovered from carrion-infesting flies in Missouri. *A. ridibunda*, however, was recovered from *Ravinia assidua* (Walker) reared in cow manure. During the summer of 1967, 38 *A. ridibunda* were recovered from 320 *R. assidua*. The highest parasitism of *R. assidua* in one collection was 26% on June 22. The average parasitism over the season was nearly 12%. *R. assidua* was the only host recorded for *A. ridibunda*.

Because *A. ridibunda* in Missouri did not occupy the same ecological niche as the species reported as *A. ridibunda* by Lindquist, the status

of *A. ridibunda* was investigated. All references to *A. ridibunda* in the literature do not apply to the same species. The species in Missouri associated with cow manure is *ridibunda*. The species associated with carrion reported by Lindquist (op. cit.) and Roberts (1935) is a distinct but closely related species. This is based mostly on differences in size and certain morphological features, but also on host and habitat preference.

Acknowledgment.—We are grateful to Paul M. Marsh of the U. S. Department of Agriculture for identifying *A. ridibunda* and for the information regarding the two similar species of *Alysia*.

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A NEW SPECIES OF ALYSIA PARASITIC ON CARRION-FEEDING FLIES (Hymenoptera: Braconidae)

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The following species is described in connection with studies being made on dung-feeding flies and their parasites by L. P. Burgess, Jr. and C. W. Wingo (see this issue, page 204) at Columbia, Missouri. This species, *Alysia cariosa* Marsh, is similar to *A. ridibunda* Say, and

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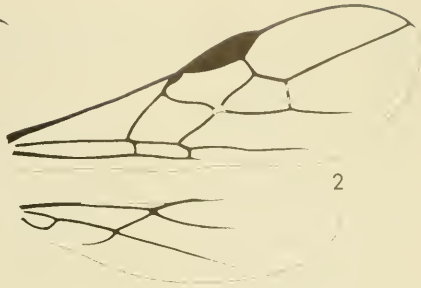

Fig. 1, *Alysia cariosa*, n. sp., wing venation. Fig. 2, *A. ridibunda* Say, wing venation.

the two have been confused in past literature. *A. ridibunda* appears to parasitize dung-feeding flies, whereas *A. cariosa* attacks only carrion-infesting flies. Hence, several earlier biological papers in which *A. ridibunda* was mentioned as a parasite of blow flies in carrion (e. g. Lindquist, 1932 and 1940; Roberts, 1935) actually apply to *A. cariosa*. A long series of the material used by Lindquist is in the U. S. National Museum and is included in the type series of *A. cariosa*.

The most important characters which distinguish *A. cariosa* from *A. ridibunda* are its generally larger size, the weak or absent notauli, the tridentate rather than bidentate mandibles, the parallel rather than converging carinae on the first abdominal tergum, the wing venation (compare figs. 1 and 2), and completely orange-red abdomen in the male. The male of *ridibunda* has the abdomen red with the apex black.

Alysia cariosa, n. sp.
(Fig. 1)

Female.—Length of body, 4–7.5 mm; ovipositor, 1–2.5 mm. Thorax and abdomen orange-red; head, including base of mandibles, deep maroon or nearly black, mandibles often lighter at apex; proepisternum and legs, including coxae, deep maroon to dark brown; wings completely dusky, veins dark brown, stigma often light brown. Head entirely smooth, nearly 1.5 times as wide as high and slightly wider than thorax; face with a weakly raised median line from antennae to clypeus; frons with a shallow pit between lateral ocelli; mandibles with 3 distinct teeth, rugose on at least basal ½; antennae 39- to 49-segmented, first 2 flagellar segments about equal in length, but the second often slightly longer than the first, segments in apical ½ of flagellum about as wide as long. Thorax smooth and polished; notauli absent or, at most, represented by short, weak indentations anteriorly; scutellar furrow with 1 median cross carina; mesopleural and subalar furrows smooth; propodeum with strong median and lateral carinae, the median one forked apically; legs slender; last segment of tarsus longer than third and fourth combined; tarsal claws large. Wing venation as in fig. 1; stigma about 7 or 8 times longer than wide; radius arising from apical ⅓ of stigma; recurrent vein usually entering base of second cubital cell, often interstitial with first intercubitus;

nervulus interstitial with basal vein. Abdomen smooth and polished; first tergum about as long as apical width, with 2 median, parallel carinae which extend posteriorly from base to apical ⅓ of tergum; ovipositor at most as long as abdomen beyond first tergum.

Male.—Essentially as in female; length of body, 5.5–9 mm; first abdominal tergum occasionally rugose between carinae.

Holotype Female.—TEXAS: Uvalde, flesh and green bottle flies, Dec., '35, A. W. Lindquist. USNM 69957.

Paratypes.—ARIZONA: Duncan, 2 ♀♀, 1 ♂, September 22, 1931, parasite of blow fly, A. W. Lindquist, Bishop No. 17273. TEXAS: 23 ♀♀, 57 ♂♂, same data as holotype. All paratypes are deposited in the U. S. National Museum.

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WATER MITES OF THE GENUS STYGOMOMONIA IN NORTH AMERICA (ACARINA, MOMONIIDAE)[1]

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This paper treats eight species of *Stygomomonia* Szalay known from North America, six of which are described as new. The two previously described species are S. *riparia* Habeeb and S. *moodyi* Mitchell. Holotypes and allotypes will be deposited in the Field Museum of Natural History (= Chicago Natural History Museum). In presenting measurements in this paper, those of the holotype and allotype are given first. If a series of specimens is available, the range of variation is given in parentheses following the measurements of the primary types.

Members of the genus *Stygomomonia* exhibit considerable intraspecific variation in number of heavy setae on the fourth coxae and in shape and distance apart of the suture lines of the third and fourth coxae. The structure of the palp is very similar in all species of *Stygomomonia* s. s. and is therefore nearly useless in defining species. The author has found proportions of the distal segments of the first leg, structure of the peripheral thickening of the dorsal shield, and

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degree of fusion of the posterior glandularia platelets of the venter to be the most stable characters which seem to be of taxonomic value. Since most of the species diagnoses are based on a combination of characters, a key to species is provided as an aid in identification.

The genus is primarily a group confined to interstitial waters, but where abundant, specimens are occasionally taken in "surface water" collections. Since the subsurface water habitat has been poorly sampled in many areas of the world, the true distribution of the genus is probably unknown. Species of *Stygomomonia* have been collected in Europe, Japan and North America. A rather unusual species from New Zealand has also been tentatively assigned to this genus. It is interesting that extensive collections of interstitial water mites made by the author in Western India were negative as far as *Stygomomonia* was concerned.

It is here proposed that the genus *Stygomomonia* be divided into three subgenera, two of which have a Holarctic distribution and a third which is known only from New Zealand.

Subgenus **Stygomomonia** Szalay

Diagnosis: Characters of the genus *Stygomomonia*; anterior coxal groups (first and second coxae) separated by articular membrane from the third coxae; genital field of male subterminal in position; dorsal shield entire; excretory pore not fused with the posterior glandularia platelets.

Subgenotype: *Stygomomonia latipes* Szalay.

Discussion: The separated anterior coxal groups are diagnostic for the typical subgenus. Members of *Stygomomonia* s. s. are known from Europe, Japan and North America.

Subgenus **Allomomonia**, n. subgen.

Diagnosis: Characters of the genus *Stygomomonia*; anterior coxal groups (first and second coxae) fused with the third coxae; genital field of male located at extreme posterior end of ventral shield; dorsal shield entire; excretory pore not fused with the posterior glandularia platelets.

Subgenotype: *Stygomomonia moodyi* Mitchell.

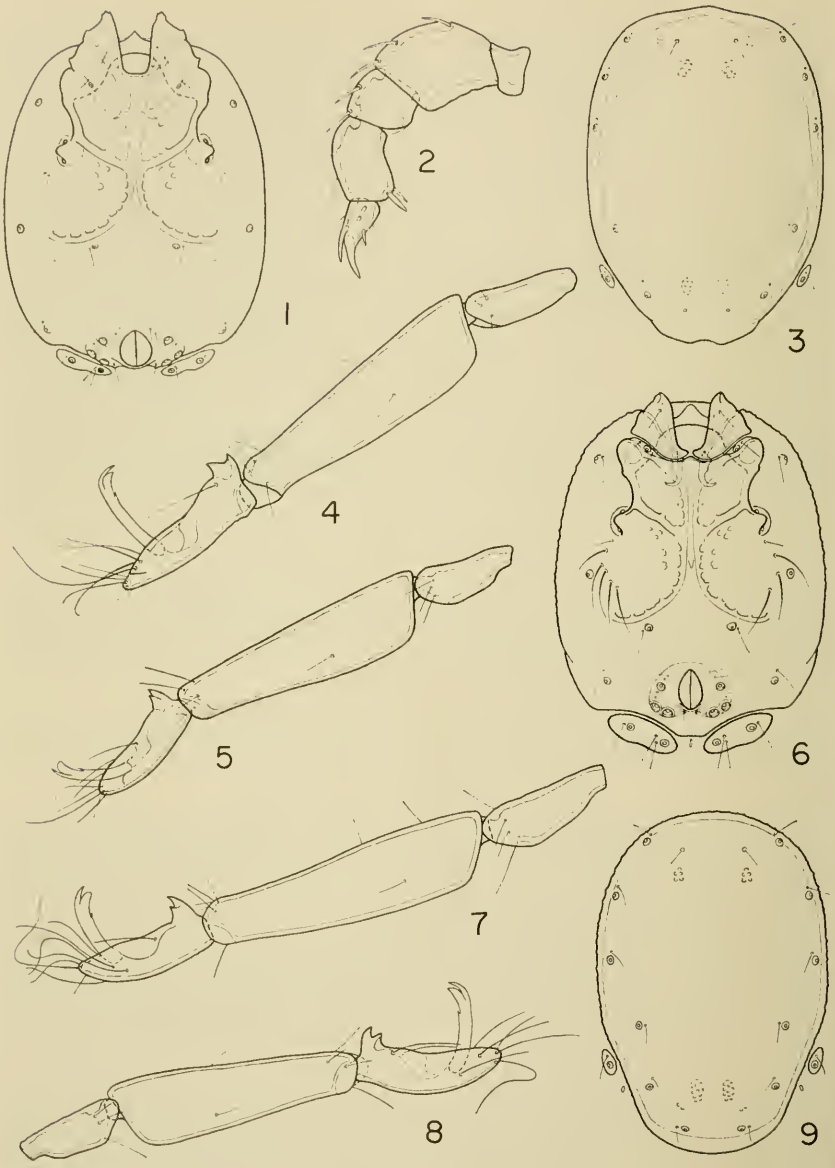
Discussion: The fused condition of the coxae and the entire dorsal shield are characters which will separate *Allomomonia* from other subgenera of *Stygomomonia*. The new subgenus has representatives in Japan and North America.

Subgenus **Neomomonia**, n. subgen.

Diagnosis: Characters of the genus *Stygomomonia*; anterior coxal groups (first and second coxae) fused with the third coxae; dorsal shield divided into anterior and posterior sclerites; dorsal shield closely flanked by several pairs of platelets; excretory pore fused with the enlarged posterior glandularia platelets.

Subgenotype: *Stygomomonia torquipes* Hopkins.

Discussion: The new subgenus is based on a female specimen described by Hopkins (1966) from New Zealand. It appears to be a rather divergent member of the genus *Stygomomonia* but, until the male is known, its placement in this genus should be regarded as tentative.



Figs. 1–3, *Stygomomonia moodyi* Mitchell: 1, ventral shield, ♂; 2, ♂ palp; 3, dorsal shield, ♂. Fig. 4, *S. separata*, n. sp., distal segments, 1st leg, ♂. Figs. 5, 6, 9, *S. occidentalis*, n. sp.: 5, distal segments, 1st leg, ♀; 6, ventral shield, ♂; 9, dorsal shield, ♂. Fig. 7, *S. neomexicana*, n. sp., distal segments, 1st leg, ♀. Fig 8, *S. pallida*, n. sp., distal segments, 1st leg, ♂.

Key to North American Species of Stygomomonia

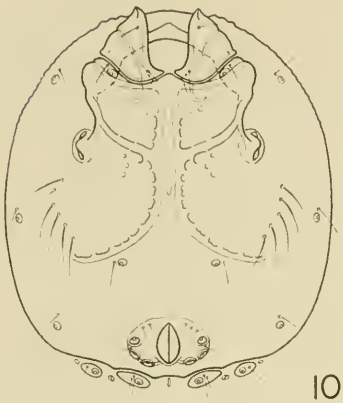
1. Anterior coxal groups (first and second coxae) fused with the third coxae (fig. 1); claw of first leg short and decidedly recurved (fig 30) (subgenus *Allomomonia*) ..... **moodyi** Mitchell
   Anterior coxal groups separated from the third coxae (fig. 6); claw of first leg relatively long and narrow, and only slightly recurved (fig. 4) (subgenus *Stygomomonia*) 2
2. Four pairs of genital acetabula present (figs. 18, 25) ..... **riparia** Habeeb
   Three pairs of genital acetabula present (figs. 21, 23) 3
3. The two pairs of glandularia posterior to the genital field located on small sclerites which are either separated (fig. 10) or only lightly fused (fig. 28) 4
   The two pairs of glandularia posterior to the genital field located on relatively large sclerites which are broadly fused on their respective sides (fig. 6) 5
4. Dorsal projection on basal portion of I-Leg-6 somewhat proximal in relation to attachment site of segment (fig. 4) ..... **separata**, n. sp.
   Dorsal projection on basal portion of I-Leg-6 distal in relation to the attachment site of segment (fig. 7) ..... **neomexicana**, n. sp.
5. Dorsal projection on basal portion of I-Leg-6 somewhat proximal in relation to attachment site of segment (fig. 16) ..... **plana**, n. sp.
   Dorsal projection on basal portion of I-Leg-6 distal in relation to the attachment site of segment (figs. 5, 8, 22) 6
6. I-Leg-4 greatly expanded at distal end (fig. 22) ..... **ozarkensis**, n. sp.
   I-Leg-4 only slightly expanded at distal end (figs. 5, 8) 7
7. I-Leg-5 more than twice the length of I-Leg-6 (fig. 5); peripheral thickening of dorsal shield not extending medially towards posterior glandularia (fig. 9) ..... **occidentalis**, n. sp.
   I-Leg-5 less than twice the length of I-Leg-6 (fig. 8); peripheral thickening of dorsal shield extending medially towards posterior glandularia (fig. 29) ..... **pallida**, n. sp.

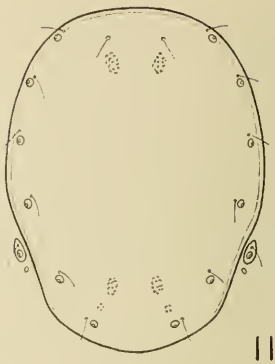
Stygomomonia (Allomomonia) moodyi Mitchell
(Figs. 1–3, 17, 30)

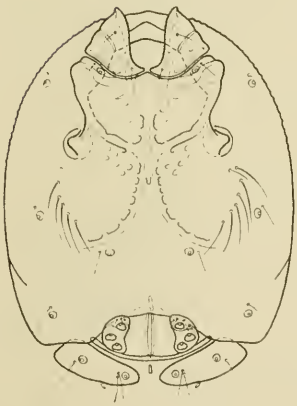
Stygomomonia moodyi Mitchell, 1959, Trans. Amer. Microsc. Soc. 78:154.

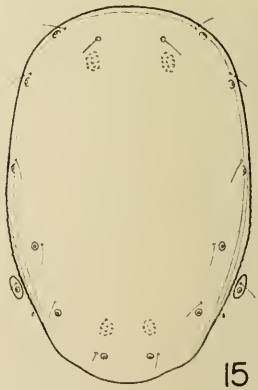
Male: Dorsal shield 426μ–471μ in length, 312μ–348μ in width; dorsal shield with ill-defined ridges near periphery (fig. 3); ventral shield, including posterior glandularia platelets 441μ–471μ in length, 350μ–395μ in width; anterior coxal groups solidly fused with the third coxae; 2 small setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; genital field 124μ–156μ in width; 3 pairs of genital acetabula; genital field terminal (fig. 1); posterior glandularia of venter fused on their respective sides into elongated platelets which are slightly constricted in middle, these platelets 69μ–79μ in greatest dimension; excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

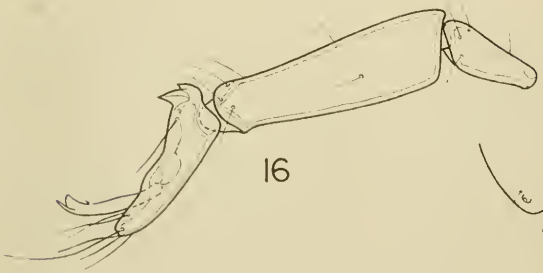
Dorsal lengths of the palpal segments: P–I, 14μ–17μ; P–II, 42μ–48μ; P–III, 21μ–24μ; P–IV, 35μ–39μ; P–V, 29μ–31μ; fig. 2 illustrates the proportions and chaetotaxy of the palp; dorsal lengths of the distal segments of the first leg:











Figs. 10–12, *Stygomomonia separata*, n. sp.: 10, ventral shield, ♂; 11, dorsal shield, ♂; 12, genital field region, ♀. Figs. 13, 15, 16, *S. plana*, n. sp.: 13, ventral shield, ♀; 15, dorsal shield, ♀; 16, distal segments, 1st leg, ♀. Fig. 14, *S. occidentalis*, n. sp., ♂ palp. Fig. 17, *S. moodyi* Mitchell, genital field region, ♀.

I-Leg-4, 81μ–90μ; I-Leg-5, 104μ–121μ; I-Leg-6, 61μ–62μ; structure of first leg similar to female; swimming hairs absent.

Female: Dorsal shield 426μ–483μ in length, 319μ–380μ in width; dorsal shield similar to that illustrated for the male; ventral shield, including posterior glandularia platelets 441μ–517μ in length, 350μ–441μ in width; anterior coxal groups solidly fused with the third coxae; typically with 2 (but in one instance 3) small setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; acetabular plates and postgenital sclerite separated from the ventral shield (fig. 17); genital field 135μ–187μ in width; the individual acetabular plates 33μ–52μ in width; 3 pairs of genital acetabula; posterior glandularia as described for male, these 73μ–80μ in greatest dimension; excretory pore without associated sclerotization; eyes reduced; integumental pigment absent.

Dorsal lengths of the palpal segments: P–I, 14μ–16μ; P–II, 45μ–48μ; P–III, 21μ–24μ; P–IV, 36μ–38μ; P–V, 28μ–31μ; structure of palp similar to male; dorsal lengths of the distal segments of the first leg: I-Leg-4, 83μ-90μ; I-Leg-5, 118μ–133μ; I-Leg-6, 62μ–66μ; claw at tip of first leg recurved; fig. 30 illustrates the modification of the first leg; swimming hairs absent.

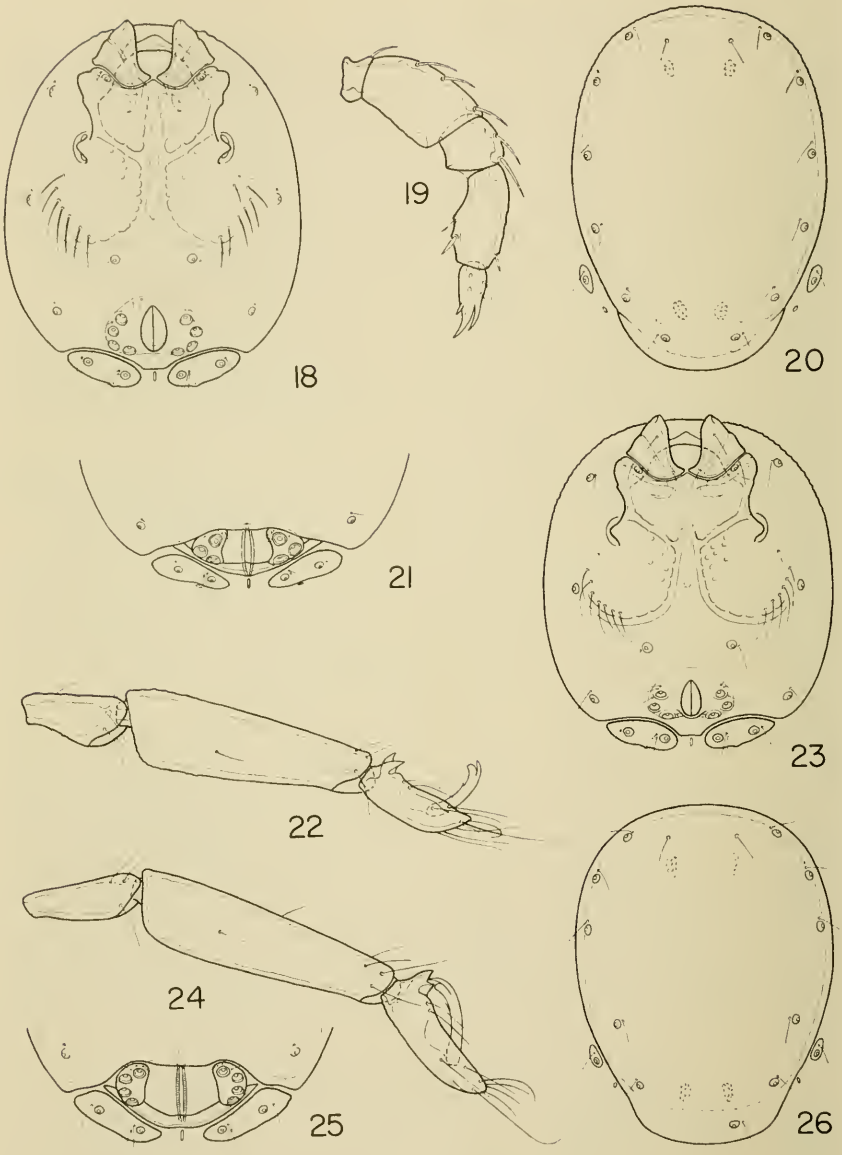
Material Examined: 1 female, from a gravel bar in the Smith River (approximately 18 miles east of Gardiner), Douglas County, Oregon, August 12, 1961; 33 males, 13 females, collected in a gravel bar in Ten Mile Creek approximately 7 miles of Yachats, Lane County, Oregon, August 13, 1961; 2 males, taken in a gravel bar in Satus Creek (approximately 3 miles south of Yakima County line), Klickitat County, Washington, August 18, 1967; 1 female, taken in bottom gravels in Battle Creek 4 miles west of Viola, Shasta County, California, July 30, 1966; 1 male, from gravel deposits in a small stream near Warm Springs, Bath County, Virginia, July 20, 1963. Mitchell originally recorded this species from Addison, Chittenden, and Washington Counties, Vermont.

Discussion: The species *S. kantoensis* described by Imamura (1959) from Japan also has the anterior coxal groups fused with the third coxae. However, the latter species possesses numerous enlarged setae on the fourth coxae as illustrated in figs. 6 and 10, and the posterior glandularia of the venter are all separated from each other. *S. moodyi* possesses two very small setae on the fourth coxae (fig. 1) and the posterior glandularia of the venter are fused on their respective sides. The western populations of this species tend to be proportionally narrower and the genital field proportionally less wide than the eastern representatives. However, these differences are not clear cut and do not seem to justify subspecific separation.

Stygomomonia (Stygomomonia) riparia Habeeb
(Figs. 18, 20, 24, 25)

Stygomomonia riparia Habeeb, 1957, Leaflets of Acadian Biology 15:8.
Stygomomonia riparia: Mitchell, 1959, Trans. Amer. Microsc. Soc. 78:156.

Male: Dorsal shield 410μ–524μ in length, 289μ–365μ in width; peripheral thickening of dorsal shield extending medially towards posterior glandularia (fig. 20); ventral shield, including posterior glandularia platelets 418μ–502μ in length, 334μ–408μ in width; anterior coxal groups separated by articular membrane from



Figs. 18, 20, 24, 25, *Stygomomonia riparia* Habeeb: 18, ventral shield, ♂; 20, dorsal shield, ♂; 24, distal segments, 1st leg, ♂; 25, genital field region, ♀. Fig. 19, S. *pallida*, n. sp., ♂ palp. Figs. 21–23, 26, S. *ozarkensis*, n. sp.: 21, genital field region, ♀; 22, distal segments, 1st leg, ♂; 23, ventral shield, ♂; 26, dorsal shield, ♂.

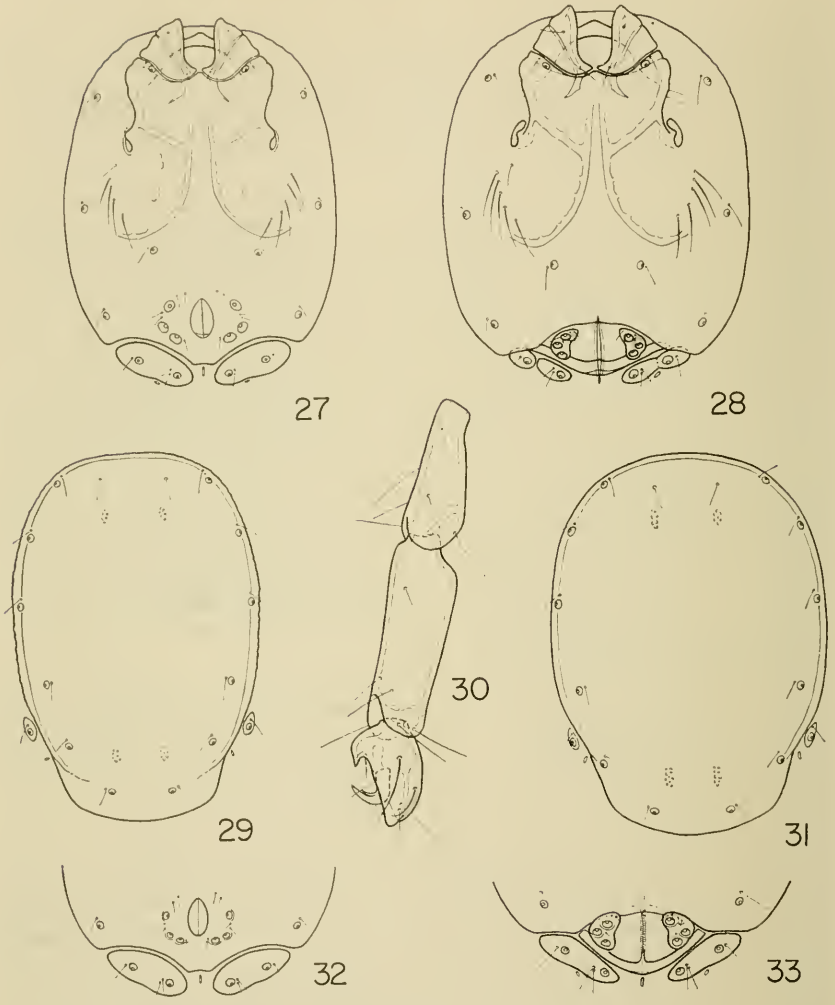
the third coxae; 5 to 7 enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; genital field 118μ–141μ in width; typically with 4 pairs of genital acetabula but occasionally with only 3 acetabula on one side, 4 on the other side; posterior glandularia fused on their respective sides into oval platelets (fig. 18); these platelets 83μ–111μ in greatest dimension; excretory pore without associated sclerotization; eyes reduced; integumental pigment absent.

Dorsal lengths of the palpal segments: P–I, 15μ–18μ; P–II, 42μ–45μ; P–III, 23μ–27μ; P–IV, 42μ–52μ; P–V, 29μ–36μ; structure of palp similar to that illustrated in fig. 19; dorsal lengths of the distal segments of the first leg: I-Leg-4, 70μ–90μ; I-Leg-5, 156μ–194μ; I-Leg-6, 76μ–80μ; greatest heights of distal segments of first leg: I-Leg-4, 28μ–35μ; I-Leg-5, 42μ–52μ; I-Leg-6, 38μ–45μ; claw at tip of first leg 48μ–52μ in length; fig. 24 illustrates the proportions and chaetotaxy of the distal segments of the first leg; swimming hairs absent.

Female: Dorsal shield 456μ–525μ in length, 319μ–358μ in width; dorsal shield similar to male; ventral shield, including posterior glandularia platelets 449μ–517μ in length, 350μ–418μ in width; anterior coxal groups separated by articular membrane from the third coxae; 4 to 7 enlarged setae present on each side of the fourth coxae posterior to insertions of the fourth legs; acetabular plates and postgenital sclerite separated from the ventral shield (fig. 25); genital field 138μ–159μ in width; the individual acetabular plates 35μ–45μ in width; typically with 4 pairs of genital acetabula, but one individual had only 3 acetabula on one side, 4 on the other side; posterior glandularia as described for male, 97μ–124μ in greatest dimension; excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

Dorsal lengths of the palpal segments: P–I, 17μ–19μ; P–II, 42μ–52μ; P–III, 23μ–27μ; P–IV, 42μ–48μ; P–V, 31μ–35μ; dorsal lengths of the distal segments of the first leg: I-Leg-4, 76μ–86μ; I-Leg-5, 173μ–201μ; I-Leg-6, 76μ–86μ; greatest heights of distal segments of first leg: I-Leg-4, 29μ–35μ; I-Leg-5, 45μ–59μ; I–Leg–6, 38μ–46μ; claw at tip of first leg 52μ–55μ in lengths; structure of palp and first leg similar to male.

Material Examined: (All collections from sand and gravel deposits of streams) 5 males, 4 females, 2 nymphs, from the St. Francis River near Sam A. Baker State Park, Wayne County, Missouri, July 9, 1960; 8 males, 5 females, same data on June 24, 1961; 8 males, 9 females, same data on June 26, 1961; 3 males, 4 nymphs, from a stream at Patterson, Wayne County, Missouri, July 11, 1960; 4 females, 2 nymphs, same data on June 25, 1961; 12 males, 5 females, 1 nymph, collected in the Black River northwest of Piedmont, Reynolds County, Missouri, July 8, 1960; 5 males, 10 females, same data on June 26, 1961; 1 female, from the Current River at Big Spring State Park, Carter County, Missouri, July 12, 1960; 5 males, 3 females, 1 nymph, taken in the Jacks Fork River at Alley Spring State Park, Shannon County, Missouri, July 13, 1960; 11 males, 4 females, 1 nymph, same area where a cold spring joins the river, July 14, 1960; 2 females, 3 nymphs, from the Meramec River 11 miles northeast of Salem, Dent County, Missouri, July 19, 1960; 1 male, 2 females, same data on July 1, 1961; 4 males, collected in the Meramec River at Cook Station, Crawford County, Missouri, July 23, 1960; 1 male, 1 female, from the Eleven Point River near Greer Spring, Oregon County, Missouri, June 27, 1961; 2 females, from the Roaring River at Eagle Rock, Barry County, Missouri, July 6, 1961; 1 male, 1 nymph, taken in the King's River, Carroll



Figs. 27, 29, *Stygomomonia pallida*, n. sp.; 27, ventral shield, ♂; 29, dorsal shield, ♂. Figs. 28, 31, *S. neomexicana*, n. sp.: 28, ventral shield, ♀; 31, dorsal shield, ♀. Fig. 30, *S. moodyi* Mitchell, distal segments, 1st leg, ♀. Fig. 32, *S. plana*, n. sp., genital field area, ♂. Fig. 33, *S. occidentalis*, n. sp., genital field area, ♀.

County, Arkansas, July 21, 1960; 8 males, 1 female, 1 nymph, found in a small stream 1 mile north of Albion, Pushmataha County, Oklahoma, July 9, 1961; 1 male, 1 female, from a small stream 4 miles south of Attica, Warren County, Indiana, July 12, 1964; 1 female, taken in a stream near Lynch, Harlan County, Kentucky, July 15, 1964; 1 female, collected in a stream near Fredonia, Licking County, Ohio, June 18, 1967; 1 male, from a stream at Cedar Falls State Park,

Hocking County, Ohio, June 18, 1967; 1 male, 3 females, from a large stream near Haynes, Hocking County, Ohio, June 18, 1967; 9 males, 6 females, taken in a tributary of the Jackson River approximately 1.5 miles south of Bacova, Bath County, Virginia, May 19, 1961; 1 male, 1 female, found in a stream near Griffen, Hamilton County, New York, August 19, 1964; 3 males, 1 female, from the North Branch of the Meduxnekeag River, Aroostook County, Maine, August 28, 1964; 1 female, collected in a small stream near Limestone, Victoria County, New Brunswick, August 26, 1964; 1 female, from the Agawa River near the southern border of Lake Superior Provincial Park, Algoma District, Ontario, August 28, 1965.

Discussion: Habeeb (1957) originally described this species from the Salmon River, Victoria County, New Brunswick. Mitchell (1959) collected this species in Chittenden County, Vermont. The presence of four pairs of acetabula will distinguish this species from all other members of the genus.

Stygomomonia (Stygomomonia) ozarkensis, n. sp.
(Figs. 21–23, 26)

Male: Dorsal shield 532μ in length, 395μ in width; peripheral thickening of dorsal shield not extending medially in direction of posterior glandularia (fig 26); ventral shield, including posterior glandularia platelets 516μ in length, 441μ in width; anterior coxal groups separated by articular membrane from the third coxae; 5 to 7 enlarged setae present on each side of fourth coxae posterior to the insertions of the fourth legs; genital field 128μ in width; 3 pairs of genital acetabula; posterior glandularia fused on their respective sides into oval platelets (fig. 23); these platelets 104μ in greatest dimension; excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

Dorsal lengths of the palpal segments: P–I, 17μ; P–II, 55μ; P–III, 27μ; P–IV, 48μ; P–V, 35μ; structure of palp similar to that illustrated in fig. 19; dorsal lengths of the distal segments of the first leg: I-Leg-4, 81μ; I-Leg-5, 197μ; I-Leg-6, 80μ; greatest height of distal segments of first leg: I-Leg-4, 41μ; I-Leg-5, 59μ; I-Leg-6, 41μ; claw at tip of first leg 48μ in length; fig. 22 illustrates the proportions and chaetotaxy of the distal segments of the first leg; swimming hairs absent.

Female: Dorsal shield 547μ in length, 441μ in width; dorsal shield similar to male; ventral shield, including posterior glandularia platelets 578μ in length, 501μ in width; anterior coxal groups separated by articular membrane from the third coxae; 5 to 6 enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; acetabular plates and postgenital sclerite separated from the ventral shield (fig. 21); genital field 166μ in width; 3 pairs of genital acetabula; posterior glandularia platelets as described for male; postgenital sclerite 201μ in width; excretory pore without associated sclerotization; eyes reduced; integumental pigment absent.

Holotype: Adult male, from a gravel bar in a small stream on Route 116 approximately 1 mile west of Colcord, Delaware County, Oklahoma, July 7, 1961. *Allotype*: adult female, same data as holotype.

Discussion: The combination of three pairs of acetabula, lack of a

medial extension of the peripheral thickening of the dorsal shield, relatively short I-Leg-6 and greatly expanded I-Leg-4 are diagnostic for the present species.

Stygomomonia (Stygomomonia) pallida, n. sp.

(Figs. 8, 19, 27, 29)

Male: Dorsal shield 517μ(464μ–517μ) in length, 350μ(319μ–350μ) in width; peripheral thickening of dorsal shield extending medially in direction of posterior glandularia (fig. 29), but not always as pronounced as in illustration; ventral shield, including posterior glandularia platelets 517μ(456μ–517μ) in length, 388μ(373μ–410μ) in width; anterior coxal groups separated by articular membrane from the third coxae; 5(4–6) enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; genital field 128μ (118μ–130μ) in width; 3 pairs of genital acetabula, these 11μ–17μ in diameter; posterior glandularia fused on their respective sides into oval platelets (fig. 27); these platelets 107μ(96μ–107μ) in greatest dimension; excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

Dorsal lengths of the palpal segments: P–I, 15μ(15μ–18μ); P–II, 48μ(46μ–52μ); P–III, 27μ(24μ–28μ); P–IV, 45μ(43μ–48μ); P–V, 33μ(33μ–38μ); fig. 19 illustrates the proportions and chaetotaxy of the palp; dorsal lengths of the distal segments of the first leg: I-Leg-4, 86μ(80μ–86μ); I-Leg-5, 194μ(187μ–204μ); I-Leg-6, 104μ(98μ–104μ); greatest height of distal segments of first leg: I-Leg-4, 34μ(31μ–34μ); I-Leg-5, 52μ(52μ–55μ); I-Leg-6, 45μ(42μ–45μ); claw at tip of first leg 69μ(66μ–69μ) in length; fig. 8 shows the distal segments of the first leg; swimming hairs absent.

Female: Unknown.

Holotype: Adult male, taken in a sand and gravel bar in a tributary of the Jackson River approximately 1.5 miles south of Bacova, Bath County, Virginia, May 19, 1961. *Paratypes*: 5 males, same data as holotype.

Discussion: The combination of three pairs of genital acetabula, presence of medial extensions of the peripheral thickening of the dorsal shield, and relatively long I-Leg-6 (over one-half length of I-Leg-5) will distinguish the present species from other members of the genus.

Stygomomonia (Stygomomonia) plana, n. sp.

(Figs. 13, 15, 16, 32)

Male: Dorsal shield 456μ in length, 312μ in width; structure of dorsal shield similar to that illustrated and described for female; ventral shield, including posterior glandularia platelets 454μ in length, 334μ in width; anterior coxal groups separated by articular membrane from the third coxae; 6 or 7 enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; genital field 90μ in width; 3 pairs of genital acetabula, these approximately 10μ in diameter; posterior glandularia fused on their respective sides into oval glandularia platelets (fig. 32); these platelets 107μ in greatest dimension; ex-

cretory pore without associated sclerotization; eyes reduced; integumental pigment absent.

Dorsal lengths of the palpal segments: P–I, 17μ; P–II, 48μ; P–III, 27μ; P–IV, 45μ; P–V, 33μ; palp similar to that illustrated in fig. 14; dorsal lengths of the distal segments of the first leg: I-Leg-4, 69μ; I-Leg-5, 173μ; I-Leg-6, 111μ; claw at tip of first leg 69μ in length; structure of first leg similar to female; swimming hairs absent.

Female: Dorsal shield 445μ(441μ–502μ) in length, 304μ(289μ–349μ) in width; peripheral thickened area of dorsal shield not extending medially in region of posterior glandularia (fig.15); ventral shield 464μ(434μ–517μ) in length, 334μ(327μ–380μ) in width; anterior coxal groups separated by articular membrane from the third coxae; 5 to 7 enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; acetabular plates and postgenital sclerite separated from the ventral shield (fig. 13); genital field 118μ(111μ–121μ) in width; the individual acetabular plates 31μ(28μ–31μ) in width; 3 pairs of genital acetabula; posterior glandularia as described for the male; these glandularia platelets 105μ(100μ–114μ) in greatest dimension; excretory pore without associated sclerotization; eyes reduced; integumental pigment absent.

Dorsal lengths of the palpal segments: P–I, 15μ(15μ–17μ); P–II, 45μ(42μ–51μ); P–III, 24μ(24μ–29μ); P–IV, 42μ(42μ–46μ); P–V, 31μ(31μ–33μ); dorsal lengths of the distal segments of the first leg; I-Leg-4, 78μ(69μ–80μ); I-Leg-5, 170μ(170μ–207μ); I-Leg-6, 111μ(104μ–134μ); greatest height of distal segments of first leg: I-Leg-4, 29μ(28μ–29μ); I-Leg-5, 48μ(48μ–52μ); I-Leg-6, 48μ(45μ–48μ); claw at tip of first leg 80μ(69μ–93μ); dorsoproximal portion of I-Leg-6 extending slightly proximally (fig. 16); swimming hairs absent.

Holotype: Adult male, taken in gravel deposits in the South Fork of the Trinity River near Forest Glen, Trinity County, California, July 30, 1966. *Allotype*: adult female, same data as holotype. *Paratypes*: 1 female, same data as holotypes; 1 male, found in a gravel bar in Salmon Creek on Highway no. 1, Monterey County, California, July 23, 1966; 1 female, from gravel deposits in the Big Sur River at Big Sur Camp Grounds, Monterey County, California, July 23, 1966; 1 female, collected in a gravel bar in the Van Duzen River 16 miles east of Bridgeville, Humboldt County, California, July 30, 1966; 1 female, found in a gravel bar in Satus Creek (on US 97 approximately 3 miles south of the Yakima County line), Klickitat County, Washington, August 18, 1961.

Discussion: The combination of three pairs of acetabula, lack of medial extensions of the peripheral thickening of the dorsal shield, enlarged posterior glandularia platelets, and comparatively large I-Leg-6 will separate the present species from all other members of the genus.

Stygomomonia (Stygomomonia) occidentalis, n. sp.

(Figs. 5, 6, 9, 14, 33)

Male: Dorsal shield 410μ(410μ–547μ) in length, 289μ(289μ–395μ) in width; peripheral thickening of dorsal shield not extending medially in region of posterior

glandularia (fig. 9); ventral shield, including posterior glandularia platelets 426μ(426μ–547μ) in length, 327μ(327μ–449μ) in width; anterior coxal groups separated by articular membrane from the third coxae; 3–5(3–6) enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; genital field 98μ(98μ–117μ) in width; 3 pairs of genital acetabula, these 10μ(8μ–10μ) in diameter; posterior glandularia fused on their respective sides into oval platelets (fig. 6); excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

Dorsal lengths of the palpal segments: P–I, 14μ(14μ–18μ); P–II, 47μ(47μ–55μ); P–III, 22μ(22μ–27μ); P–IV, 42μ(42μ–48μ); P–V, 29μ(29μ–38μ); fig. 14 illustrates the proportions and chaetotaxy of the palp; dorsal lengths of the distal segments of the first leg: I-Leg-4, 69μ(69μ–83μ); I-Leg-5, 159μ(159μ–194μ); I-Leg-6, 73μ(73μ–93μ); greatest height of the distal segments of the first leg: I-Leg-4, 28μ(28μ–32μ); I-Leg-5, 42μ(42μ–52μ); I-Leg-6, 31μ(31μ–38μ); claw at tip of first leg 48μ(48μ–62μ) in length; structure of first leg similar to female; swimming hairs absent.

Female: Dorsal shield 441μ(441μ–547μ) in length, 304μ(304μ–395μ) in width; dorsal shield similar to that of male; ventral shield, including posterior glandularia platelets 440μ(440μ–539μ) in length, 334μ(334μ–440μ) in width; anterior coxal groups separated by articular membrane from the third coxae; 5–7(4–7) enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; acetabular plates and postgenital sclerite separated from the ventral shield (fig. 33); genital field 121μ(121μ–159μ) in width; the individual acetabular plates 26μ(26μ–34μ) in width; 3 pairs of genital acetabula, these 10μ(9μ–12μ) in diameter; postgenital sclerite 145μ(145μ–200μ) in width; posterior glandularia as described for the male; excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

Dorsal lengths of the palpal segments: P–I, 13μ(13μ–17μ); P–II, 46μ(46μ–55μ); P–III, 24μ(24μ–28μ); P–IV, 43μ(43μ–50μ); P–V, 32μ(32μ–41μ); palp similar to male; dorsal lengths of the distal segments of the first leg: I-Leg-4, 71μ(71μ–90μ); I-Leg-5, 173μ(170μ–211μ); I-Leg-6, 76μ(76μ–100μ); greatest height of the distal segments of the first leg: I-Leg-4, 28μ(28μ–35μ); I-Leg-5, 42μ(42μ–55μ); I-Leg-6, 31μ(31μ–38μ); claw at tip of first leg 46μ(46μ–66μ) in length; fig. 5 illustrates these segments; swimming hairs absent.

Holotype: Adult male, taken in a sand bar in the Rogue River (1 mile south of the Douglas County line), Jackson County, Oregon, August 11, 1961. *Allotype*: adult female, same data as holotype. *Paratypes*: 1 female, same data as holotype; 3 males, from a gravel bar in Swauk Creek at Swauk Creek Camp Ground, Kittitas County, Washington, August 19, 1961; 2 males, 11 females, collected in a gravel bar in the Fisher River 30 miles southeast of Libby, Lincoln County, Montana, August 22, 1961; 1 male, 1 female, from a gravel bar in the Swan River approximately 6 miles southeast of Bigfork, Lake County, Montana, August 25, 1961; 1 male, from a gravel bar in Salmon Creek on Highway no. 1, Monterey County, California, July 23, 1966; 1 male, 2 females, taken in a gravel bar in Moccasin Creek (on State Road no. 49 six miles southeast of State Road no. 120), Tuolumne County, California, July 24, 1966.

Discussion: The combination of three pairs of acetabula, lack of medially-directed extensions of the peripheral thickening of the dorsal shield, enlarged posterior glandularia platelets, and relatively short I-Leg-6 will separate *S. occidentalis* from all other species of the genus found in North America.

Stygomomonia (Stygomomonia) separata, n. sp.
(Figs. 4, 10–12)

Male: Dorsal shield 562μ(502μ–562μ) in length, 410μ(380μ–410μ) in width; peripheral thickening of the dorsal shield not extending medially in region of the posterior glandularia (fig. 11); ventral shield, including posterior glandularia platelets 540μ(494μ–540μ) in length, 464μ(441μ–464μ) in width; anterior coxal groups separated by articular membrane from the third coxae; 4–5(3–5) enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; genital field 121μ(107μ–121μ) in width; 3 pairs of genital acetabula; the 2 pairs of glandularia posterior to the ventral shield small and separated (fig. 10); excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

Dorsal lengths of the palpal segments: P–I, 16μ(14μ–17μ); P–II, 55μ(48μ–55μ); P–III, 27μ(24μ–27μ); P–IV, 52μ(48μ–52μ); P–V, 38μ(32μ–38μ); structure of palp similar to that illustrated in fig. 14; dorsal lengths of the distal segments of the first leg: I-Leg-4, 91μ(80μ–91μ); I-Leg-5, 239μ(215μ–239μ); I-Leg-6, 142μ(128μ–142μ); greatest height of distal segments of first leg: I-Leg-4, 31μ(29μ–31μ); I-Leg-5, 66μ(56μ–66μ); I-Leg-6, 52μ(48μ–52μ); dorsoproximal portion of I-Leg-6 extending somewhat proximally (fig. 4); claw at tip of first leg 100μ in length; swimming hairs absent.

Female: Dorsal shield 586μ(532μ–608μ) in length, 456μ(395μ–456μ) in width; dorsal shield similar to that of male; ventral shield, including posterior glandularia platelets 570μ(525μ–608μ) in length, 502μ(456μ–524μ) in width; anterior coxal groups separated by articular membrane from the third coxae; 5–7(4–7) enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; acetabular plates and postgenital sclerite separated from the ventral shield (fig. 12); genital field 149μ(142μ–168μ) in width; the individual acetabular plates 38μ(36μ–42μ) in width; 3 pairs of genital acetabula; the posterior glandularia as described for the male; excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

Dorsal lengths of the palpal segments: P–I, 17μ(16μ–20μ); P–II, 62μ(59μ–62μ); P–III, 35μ(29μ–35μ); P–IV, 55μ(50μ–55μ); P–V, 42μ(38μ–43μ); dorsal lengths of the distal segments of the first leg: I-Leg-4, 97μ(93μ–100μ); I-Leg-5, 263μ (231μ–263μ); I-Leg-6, 149μ(142μ–149μ); greatest height of distal segments of the first leg: I-Leg-4, 35μ(34μ–35μ); I-Leg-5, 72μ(66μ–72μ); I-Leg-6, 59μ (52μ–59μ); claw at tip of first leg 107μ(93μ–107μ) in length; structure of palp and first leg similar to male; swimming hairs absent.

Holotype: Adult male, found in a gravel bar in Satus Creek (on US 97 approximately 3 miles south of the Yakima County Line), Klickitat County, Washington, August 18, 1961. *Allotype*: adult female, same

data as holotype. *Paratypes*: 1 female, same data as holotype; 4 males, 12 females, from a gravel bar in Ten Mile Creek approximately 7 miles south of Yachats, Lane County, Oregon, August 13, 1961; 1 female, taken in a gravel bar in the Fisher River 30 miles southeast of Libby, Lincoln County, Montana, August 22, 1961.

Discussion: There are three known species of *Stygomomonia s. s.* which possess two pairs of small glandularia platelets at the posterior end of the ventral shield. These include *S. hachiojiensis* described by Imamura (1959) from Japan, and the two North American species, *S. separata* and *S. neomexicana*. The present species differs in that I-Leg-6 is more than one-half the length of I-Leg-5.

Stygomomonia (Stygomomonia) neomexicana, n. sp.
(Figs. 7, 28, 31)

Female: Dorsal shield 562μ in length, 410μ in width; peripheral thickening of the dorsal shield extending somewhat medially in direction of posterior glandularia (fig. 31); ventral shield, including posterior glandularia platelets 555μ in length, 471μ in width; anterior coxal groups separated by articular membrane from the third coxae; 5 enlarged setae present on each side of the fourth coxae posterior to the insertions of the fourth legs; acetabular plates and postgenital sclerite separated from the ventral shield; genital field 145μ in width; the individual acetabular plates 31μ in width; 3 pairs of genital acetabula; posterior glandularia platelets small, separated on one side, lightly fused on the other side (fig. 28); excretory pore without associated sclerotization; eyes reduced; integumental pigmentation absent.

Dorsal lengths of the palpal segments: P–I, 21μ; P–II, 60μ; P–III, 32μ; P–IV, 55μ; P–V, 41μ; structure of palp similar to that illustrated in fig. 14; dorsal lengths of the distal segment of the first leg: I-Leg-4, 100μ; I-Leg-5, 228μ; I-Leg-6, 98μ; greatest height of the distal segments of the first leg: I-Leg-4, 38μ; I-Leg-5, 59μ; I-Leg-6, 45μ; claw at tip of first leg 66μ in length; figure 7 illustrates these segments; swimming hairs absent.

Male: Unknown.

Holotype: Adult female, taken in a gravel bar in Whitewater Creek approximately 5 miles northeast of Glenwood, Catron County, New Mexico, July 13, 1966.

Discussion: The structure of I-Leg-6 with its dorsoproximal projection extending distally (fig. 7) will separate the present species from both *S. hachiojiensis* and *S. separata*.

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THE GENUS TYPOPSILOPA CRESSON IN THE WESTERN HEMISPHERE (DIPTERA: EPHYDRIDAE)

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The genus *Typopsilopa* Cresson has only two recorded American species, *atra* (Loew), thought to range from Oregon to Ontario and south to California, Florida, and Central America, and *flavitarsis* Cresson, a Neotropical species ranging to Arizona and the southern states. Examination of the male genitalia of available specimens reveals that these species have been confused with each other, that two new North American species have been confused under *atra*, and that there are three new Neotropical species closely related to *flavitarsis*. The species are readily separated by examination of the male genitalia, but they are very difficult to recognize by using external characters. Cresson applied the name *Psilopa nigra* Williston to a species of *Helaeomyia*, but examination of Williston's type shows that it is a *Typopsilopa* and identical with *flavitarsis* Cresson, which falls as a synonym.

The types of the new species here described are in the U. S. National Museum (abbreviated USNM in this paper) in Washington, D.C., unless otherwise specified. I am greatly indebted to the following persons and institutions for the opportunity to study material in their respective museums and collections: Paul H. Arnaud, Jr., California Academy of Sciences, San Francisco, California (CAS); George W. Byers, University of Kansas, Lawrence (KANS); J. G. Chillcott, Canada Department of Agriculture, Ottawa, Canada (CAN); Saul Frommer, University of California, Riverside (Riverside); Harold J. Grant, Academy of Natural Sciences of Philadelphia, Pennsylvania (ANSP); R. O. Schuster, University of California, Davis (Davis); and Pedro W. Wygodzinsky, American Museum of Natural History (AMNH), New York, N. Y.

Genus **Typopsilopa** Cresson

Typopsilopa Cresson, 1916, Ent. News 27:147.—Cresson, 1947, Trans. Amer. Ent. Soc. 73:123 (syn.: *Psilopina*). Type-species, *Typopsilopa flavitarsis* Cresson, orig. des., = *nigra* (Williston).

Psilopa, subg. *Psilopina* Becker, 1926, in Lindner, Flieg. Pal. Reg., fam. 56, p. 38. Type-species, *Ephygrobia electa* Becker, orig. des.

Small black subshining flies with hyaline, unmarked wings, pale halter knobs, and legs except portions of the tarsi blackish; macrochaetae strong.

Head moderately short and broad; breadth-height-length proportions as 3–6–8.

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Eyes bare. Frons short and sloping toward antennae, 0.41 as broad as head; mesofrons and orbits poorly differentiated; 1 pair of long reclinate orbitals, a proclinate seta arising slightly anterolaterad and about a third as long as orbital; inner and outer verticals long, both reclinate; a pair of long proclinate ocellars arising slightly behind level of anterior ocellus. Vertex convex but not sharply so; ocellar triangle equilateral; occiput with fine setae; cheeks setose and bearing 2–3 short bristles, the ventral one longer. Face nearly as broad as frons, slightly convex, with small foveae under the antennae; most prominent at level of the strong upper facial which is located at a third to half the distance from epistomal margin to antenna base; a second lower facial, a third to half as long as upper, and several fine setae in facial series. Epistomal margin slightly emarginate, clypeus moderately developed and exposed; palpi and proboscis normally developed. Antenna with second segment bearing a long, stout, proclinate spine at anterodorsal corner; third segment short, 1.2–1.9 times as long as broad; arista with 8–12 long dorsal rays.

Thorax moderately stout; mesonotum convex anteriorly, more flattened caudad; scutellum moderately flat; 2 pairs of notopleurals; 1 humeral; 1 presutural; 1 supra-alar; 1 intra-alar; 3 pairs of dorsocentrals, the anteromost located before the suture, the posterior pair (not a true dorsocentral) more closely approximated in front of scutellum; 2 pairs of marginal scutellars; all bristles long; surface of mesonotum and scutellum subshining but coarsely scoriaceous, also bearing numerous fine, somewhat appressed setae, those in acrostichal area forming 8 irregular rows. One strong and 1 weak mesopleural bristle and 1 strong sternopleural; pleura also with fine setae. Legs moderately stout, without special modifications; forefemur in both sexes with anteroventral comb of 15–20 short, flattened denticles; femora with a few enlarged bristle-like hairs; midtibia without erect extensor bristles but a long, ventral bristle at tip; tarsi pale at base, distal segments variably darkened.

Wing with costa extending to fourth vein; second vein moderately long, costal index (length of second costal section divided by length of third) of American species 1.20–1.37; first posterior cell parallel-sided; fourth vein index (length of ultimate section divided by length of penultimate) 1.05–1.42.

Abdomen moderately long and broad, slightly convex dorsally, subshining, provided dorsally with numerous short appressed setae and a few short bristles at posterior segment margins. Sixth tergum slightly exposed usually in female, not in male.

The American species of *Typopsilopa* are readily separated into two groups on the basis of structure of the male genitalia. In the Atra Group, the ninth tergum is a narrow ribbon (though broader in *arnaudi*); the tenth sternum forms a narrow and ribbonlike genital arch mesad with the lateral ends expanded into setose lobes, which in *arnaudi* become elongated arms with a few heavy, black spines. The fifth sternum is a long setose plate with posterolateral corners expanded and lobelike, and the sixth sternum is a narrow bare plate with posterior end bifurcate. The anterior surstylus is a long slender process with slender tip bearing a few setae, arising with stouter base articulating between the anteroventral corner of the ninth tergum and the posterolateral process of the sixth sternum. On the midline

between the surstyli, the anteroventral processes of the hypandrium are appressed as slender, fingerlike hyaline blades. Species of this group have the foretarsus black and the mid and hindtarsi with tarsomeres 1–2 pale or dark, and 3–5 dark. This group has a northern distribution and has relatives and counterparts in Asia and Africa, although not in Europe.

The second group, which is exclusively Neotropical, is based on *nigra* (Williston), the type of the genus. In these species, the ninth tergum is broad, and in one species the cerci become modified. The greatest modifications in this group are found in the shape of the tenth sternum, which becomes elongated and massive, the anteroventral lobes more approximated, and in *manni*, bearing dense, heavy spines. The lobes of the tenth sternum, along with the apices of the anterior surstyli and the ventral processes of the hypandrium, lie at rest in a heavily sclerotized box formed by the greatly broadened and dorsally arched sixth sternum, for which the fifth sternum forms a ventral setose margin. Species of the Nigra Group have tarsomeres 1–4 pale on all legs with only the fifth dark.

Typopsilopa occupies an anomalous position, sharing characters which otherwise distinguish the subfamilies Psilopinae and Notiphilinae. For many years, it was thought to be related to *Psilopa* Fallén because of the close superficial resemblance in body form and color and most features of chaetotaxy. Cresson (1916), when he erected the genus *Typopsilopa*, compared it only with *Psilopa* and *Clasiopella* Hendel, pointing out that the generic importance of the presence or absence of the two true dorsocentrals may be questioned. It was not until 1946 that the true relationships of the genus were recognized when Cresson placed it in a new tribe of Notiphilinae, the Typopsilopini, giving the following tribal characters:

"Eyes bare; lunule not developed; ocellars approximate, and strong, aligned with or caudad of line of anterior ocellus; antennal spine strong; dorsocentrals arranged 1: 1 or 0: 1; posterior notopleural not removed dorsad; mid tibiae without erect extensors; costa extending to vein IV."

Key to the American Species of **Typopsilopa**

(See also Table 1)

1. Tarsi dark brown, at least on forelegs; face flatter in middle; sternum VI of male (figs. 1, 8) narrow and ribbonlike, usually not much more than half as wide as distance across lobes of sternum X, not markedly concave 2

   Tarsi pale at least in part on all legs; face more tumid in middle; sternum VI of male (fig. 13) broader than distance across lobes of sternum X, heavily sclerotized and forming a broad concavity into which the genital processes can be thrust anterodorsally 4

2. Lobes of sternum X (figs. 10, 12) greatly elongated arms nearly as long as the transverse basal bridge of sternum, and each bearing distally 4 long, stout, black spines; all tarsi black ..... **arnaudi**, n. sp.

Lobes of sternum X (figs. 2, 5) low and flaplike and bearing distally only fine hairs or a few bristles; at least mid and hindtarsi slightly yellowish 3

3. Sternum VI (fig. 1) of male with the bifurcate posterior portion broader than the anterior end; lobes of sternum X (fig. 2) rounded with numerous fine hairs; surstyli (fig. 3) slender and rodlike distally; third antennal segment long, 1.9 times as long as greatest breadth ..... **antennalis**, n. sp.

Sternum VI (fig. 9) of male with the bifurcate posterior portion narrower than the anterior end; lobes of sternum X angulate (fig. 5) with a few stouter bristles; surstyli (figs. 6, 11) stouter and more fingerlike distally; third antennal segment short, 1.5 times as long as basal breadth ..... **atra** (Loew)

4. Male cerci (fig. 18) produced on anteroventral ends in form of a pointed, blackish, strongly sclerotized spine; sternum X with ventromesal margin between the lateral lobes slightly concave; foreleg with only tarsomere 1 yellowish ..... **archboldi**, n. sp.

Male cerci (fig. 14) normal, anteroventral ends not spinelike; sternum X with deeply emarginate anteroventral margin; foretarsi variously darkened 5

5. Sternum X (fig. 13) with lateral lobes widely separated, low and angular, not as long as the distance between their distal points; foreleg with tarsomeres 1–4 bright yellow ..... **nigra** (Williston)

Sternum X (figs. 15, 17) with lateral lobes much longer and broader than the mesal emargination between them; foreleg with only tarsomere 1 yellowish 6

6. Lobes of sternum X (fig. 15) with fine bristles only ..... **inca**, n. sp.

Lobes of sternum X (fig. 17) covered distally with curved stout black spines ..... **manni**, n. sp.

Typopsilopa atra (Loew)

(Figs. 5–9, 11)

Psilopa atra Loew, 1862, Monogr. N. Amer. Dipt. 1:143 (male; Middle States).

Typopsilopa atra (Loew); Cresson, 1916, Ent. News 27:147 (comb.).—Cresson, 1946, Trans. Amer. Ent. Soc. 72:240 (dist.: Mass. to Oreg., s. to Fla., Utah and Calif.).—Wirth, 1965, in Stone, et al., Cat. N. Amer. Dipt. p. 743 (syn.: *scoriacea* Loew).

Psilopa scoriacea Loew, 1862, Monogr. N. Amer. Dipt. 1:142 (female; N.Y.).

Male, Female.—Wing 2.25 mm. long by 0.88 mm. broad. Shining black; mesonotum and scutellum scoriaceous, with sparse coarse brown pollen; face with slight whitish dusting, especially on sides; antenna and palpus entirely black; tarsus brownish black on foreleg, tarsomeres 1 and 2 yellowish on mid and hindlegs; wings grayish hyaline, the veins yellowish; halter knob creamy white, stem dark. Antenna with third segment short, 1.5 times as long as greatest breadth; arista with 9 rays. Strong upper facial located about a third way from epistomal margin to antenna base; face nearly flat, only slightly convex. Wing with costal index 1.39; fourth vein index; hind crossvein 1.06 times as long as breadth of first posterior cell at same level.

Male genitalia as in fig. 11. Sternum V (fig. 8) nearly twice as long as posterior breadth, with uniform sparse setose hairs on surface. Sternum VI

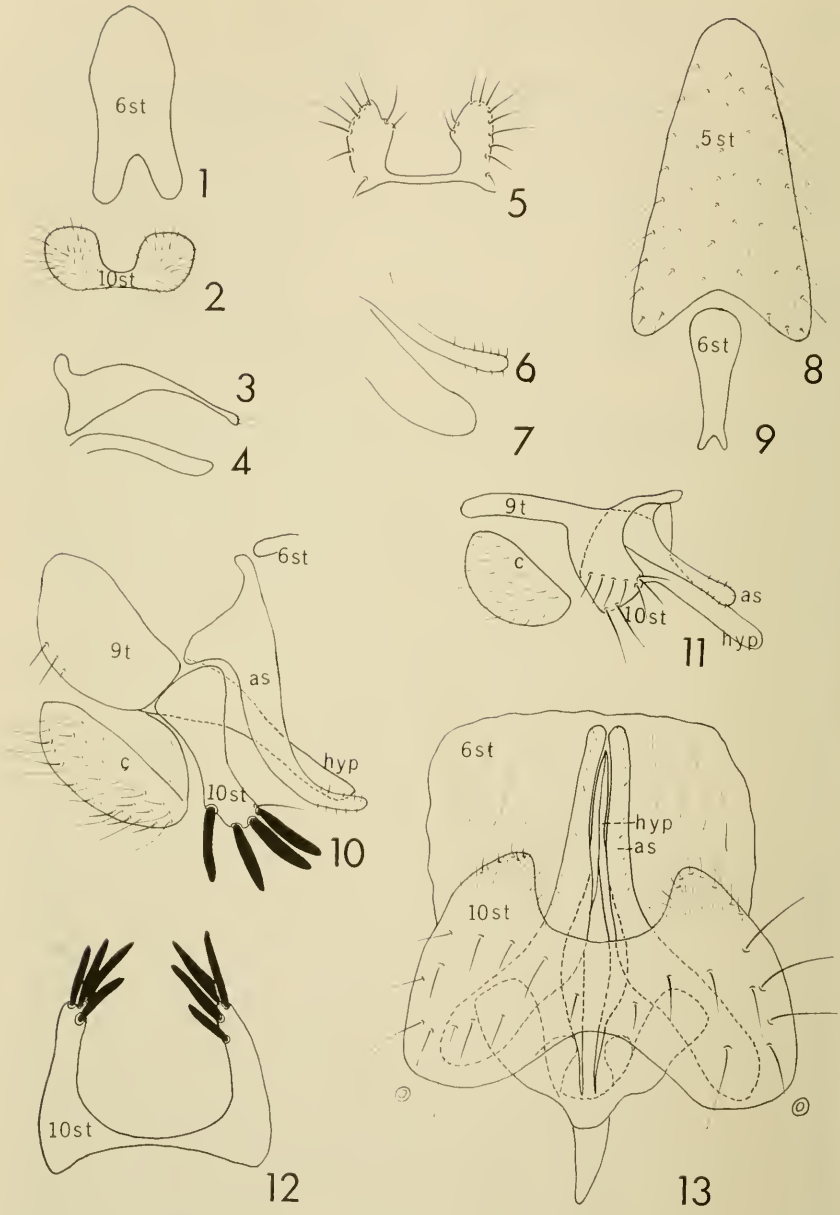
Table 1. Quantitative Characters of *Typopsilopa* species.

	Arista Rays	Antenna III (L/W)	Tarsomeres Leg I brown	Tarsomeres Legs II, III brown	Wing Length (mm.)	Costal Index	Fourth Vein Index
Atra Group							
atra (Loew)	9	1.5	1–5	3–5	2.25	1.30	1.39
antennalis n. sp.	8	1.9	1–5	3–5	2.12	1.20	1.42
arnaudi n. sp.	9	1.5	1–5	1–5	2.13	1.32	1.27
Nigra Group							
nigra (Will.)	10	1.2	5	5	2.86	1.37	1.05
archboldi n. sp.	8	1.7	2–5	5	2.56	1.26	1.08
manni n. sp.	10	1.7	2–5	5	2.56	1.22	1.28
inca sp.	12	1.9	2–5	5	2.62	1.25	1.17

(fig 9) a small, elongated, narrow sclerite without hairs or setae; anterior end broader and rounded, the ventral surface slightly concave, spoonlike, and tucked dorsally under the posterior end of sternum V; posterior end bifurcate with a pair of small lobes. Sternum X (fig. 5) with very slender mesal bridge, the lateral ends expanded in a pair of angulate lobes bearing a few stout, long, bristly hairs. Surstyli and (figs. 6, 11) processes of hypandrium (figs. 7, 11) each produced in a moderately slender fingerlike process, the former with 8–10 very fine distal setae; slenderer and straight in western specimens, and slightly curved in eastern individuals.

Distribution.—North America from California to Ontario and New York, south to Georgia and Central America.

Specimens Examined.—182 specimens, as follows: ARIZONA: Catalina Mts. (Wehrle); Wickenberg, Hassayampa R. (Wirth). ARKANSAS: Washington Co. (Rouse). CALIFORNIA: Capistrano Hot Spr. (Melander); Centerville, Fresno Co. (Yost); Lemore, Kings Co. (Hall); Live Oak Park (Melander); Panamint Springs, Inyo Co. (Howden); Riverside (Melander); San Juan Hot Spr. (Melander); Temecula (Melander); Sentenac Canyon, San Diego Co. (Bechtel); Victorville (Richards); Whitewater Fish Hatchery, Riverside Co. (Arnaud). COSTA RICA: La Caja, 8 km. w. San Jose (Schmidt). DISTRICT OF COLUMBIA: Chain Bridge (McAtee). GEORGIA: Billy's Id., Okefenokee Swamp; Tifton (Bradley); Valdosta (Young). GUATEMALA: Ingenio Railroad Sta. (Aldrich). ILLINOIS: Algonquin; Champaigne Co. (Shackleford); Chicago (Melander); Dubois (Malloch); Glen Ellyn (Melander); Meredosia (Malloch); Muncie (Malloch); Pistakee Bay (Melander); River Forest (Melander). INDIANA: Dune Park (Melander); Lafayette (Aldrich); Michigan City (Aldrich). IOWA: Ames. KANSAS: Lawrence (Sanderson); Manhattan (Sabrosky). KENTUCKY: Lexington (Aldrich). MARYLAND: Chesapeake Beach (Aldrich, Malloch). MASSACHUSETTS: Woods Hole (Melander). MEXICO: El Salto, Durango, 9000 ft. (McAlpine); Mt. Colima, pine zone, se. slope (Leech, Ross); Sierra



Figs. 1–4, *Typopsilopa antennalis*, n. sp., ♂ genitalia: 1, sternum VI, ventral view; 2, sternum X, ventral view; 3, surstylus, lateral view; 4, process of hypandrium, lateral view. Figs. 5–9, 11, *T. atra* (Loew), ♂ genitalia: 5, sternum X, ventral view; 6 and 7, apices of surstylus and process of hypandrium, respectively, New York specimen, lateral view; 8, sternum V, ventral view; 9, sternum VI,

Laguna, Big Canyon, Baja Calif. (Ross & Bohart); Tijuana, 60 km. s. (Melander). MICHIGAN: Detroit (Steyskal); Midland Co. (Dreisbach); Nottawa (Sabrosky). MISSOURI: Atherton (Adams); Columbia (Crosby). NEW JERSEY: Trenton. NEW YORK: Allegany St. Park (Wirth); Bergen (Beamer); Niagara (Melander); Sinclairville (Wirth). NORTH CAROLINA: Andrews Bald, Gr. Smokies (Melander); Highlands (Richards). OHIO: Wauseon. ONTARIO: Grand Bend (Shewell); Pt. Ryerse (Shewell). TEXAS: Austin (Melander); Brownsville (Hardy); Hunt, Guadalupe R. (Wirth); Kerrville, Henke Pond (Wirth); Dallas (Jones); Brownwood (Painter); Cibola R., Sutherland Spgs. (Nabours & Sabrosky); Liberty (Tucker); San Antonio (Melander); Uvalde, Garner State Park (Wirth). UTAH: St. George (Knowlton & Smith); Spanish Fort (Corbett). VIRGINIA: Alexandria (Aldrich); Fairy Stone St. Park (Vockeroth). WISCONSIN: Devils Lake (Melander).

Typopsilopa antennalis Wirth, n. sp.
(Figs. 1–4)

Male.—Indistinguishable externally from *atra* (Loew) except for length of third antennal segment which is 1.86 times as long as greatest breadth. Costal index 1.20; fourth vein index 1.42; hind crossvein 1.72 times as long as breadth of first posterior cell at same level. Wing 2.12 mm. long by 0.85 mm. broad.

Genitalia as in figs. 1–4. Sternum X (fig. 2) with the lateral lobes bearing fine setose hairs only, no strong bristles, the lobes placed closer together with a broader mesal bridge than in *atra*; sternum VI (fig. 1) with posterior bifurcate portion at least as broad as the anterior half; surstylus (fig. 3) with distal end very slender, bearing 2–3 fine hairs as extreme tip; process of hypandrium (fig. 4) a slender fingerlike blade.

Female.—Not distinguished with certainty from *atra* in the series recorded.

Distribution.—Florida, Georgia, South Carolina.

Types.—Holotype male, Ridgeland, South Carolina, 24 March 1954, A. Stone (USNM 69525). Paratypes, 8 males: FLORIDA: Royal Palm St. Park, 27 January 1939, A. L. Melander, 1 male. GEORGIA: Tifton, 8 June 1896, 3 males. SOUTH CAROLINA: Manning, 29–30 May 1914, W. Stone, 4 males (ANSP, USNM).

Typopsilopa arnaudi Wirth, n. sp.
(Figs. 10, 12)

Male, female.—as in *atra* (Loew) except as follows: Face slightly more carinate and not quite so dull; tarsomeres 1–5 saturate black on all legs; costal index 1.32; fourth vein index 1.27; wing 2.13 mm. long by 0.80 mm. broad.

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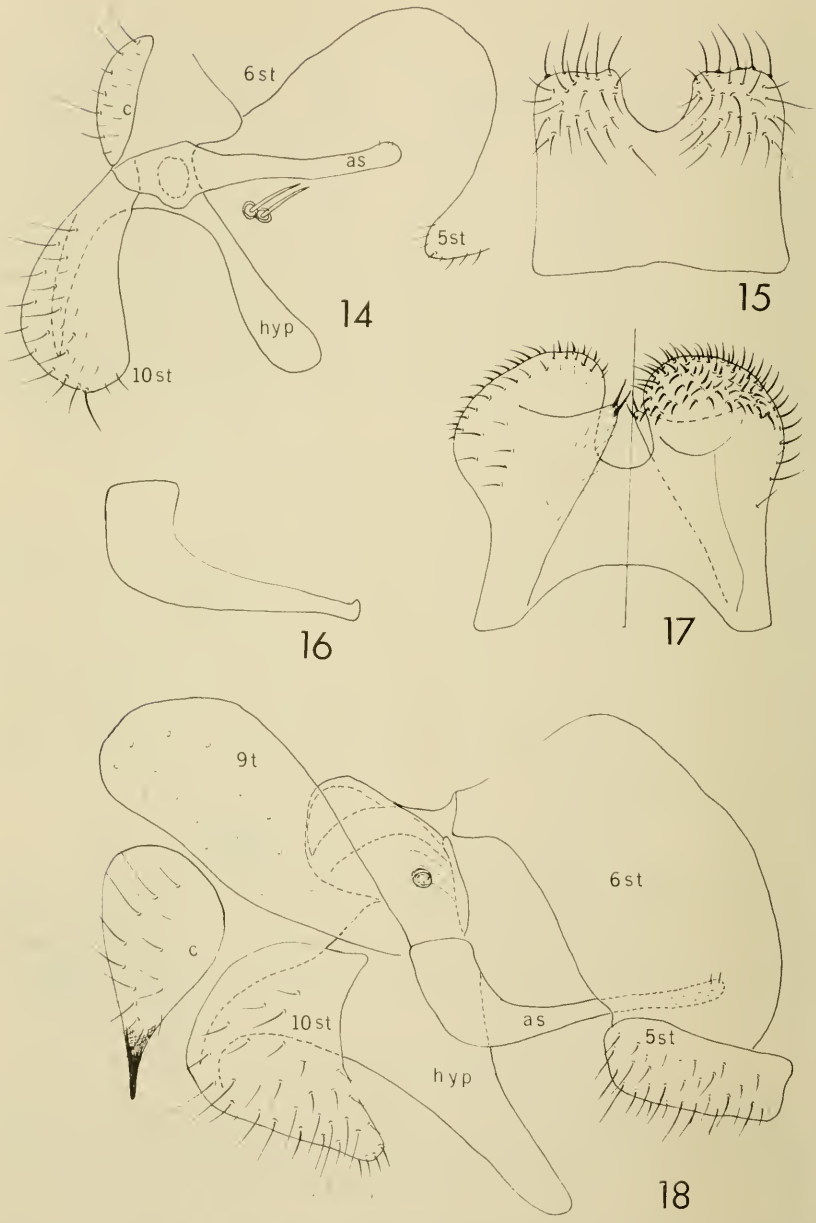
ventral view; 11, genitalia of Arizona specimen, lateral view. Figs. 10, 12, *T. arnaudi*, n. sp.: 10, ♂ genitalia, lateral view; 12, sternum X, ventral view. Fig. 13, *T. nigra*, n. sp., ♂ genitalia, ventral view. Abbreviations: as, anterior surstylus; c, cercus; hyp, hypandrium; st, sternum; t, tergum.



Figs. 14, 15, *Typopsilopa inca*, n. sp.; 14, ♂ genitalia, lateral view; 15, sternum X, ventral view. Figs. 16, 17, *T. manni*, n. sp., ♂ genitalia: 16, surstylus, lateral view; 17, sternum X, ventral view. Fig. 18, *T. archboldi*, n. sp., ♂ genitalia, lateral view. Abbreviations: as, anterior surstylus; c, cercus; hyp, hypandrium; st, sternum; t, tergum.

Male genitalia as in fig. 10. Sternum X (fig. 12) with very slender mesal bridge, the lateral lobes each greatly produced ventrocephalad in a long arm bearing 4 long, black, stout, blunt spines. Sterna V and VI similar to those of *atra*, VI with slender bifurcate posterior end; surstyli slender and curved gradually to fingerlike tip bearing a few minute subapical setae; processes of hypandrium long slender blades.

Distribution.—California and Oregon to Idaho, Utah, New Mexico, and Mexico.

Types.—Holotype male, allotype female, Deep Creek, California, 25 October 1953, A. L. Melander (USNM 69526). Paratypes, 64 males, 91 females: ARIZONA: Granite Delta, 30 May 1935, P. W. Oman, 1 male; Indian Pine, 28 August 1964, M. E. Irwin, 1 male; Montezuma Wells Nat. Mon., 30 June 1953, W. W. Wirth, 3 females; Patagonia, 24 June 1933, P. W. Oman, 1 female; same, 27 June 1953, W. W. Wirth, 1 male; Portal, S. W. Res. Sta., 26 September 1964, 1 June 1965, V. D. Roth, 2 males (Riverside); Sunnyside Canyon, Huachuca Mts., 11 July 1940, D. G. Hall, 1 female (ANSP); same, 9 July 1940, D. E. Hardy, 1 male (KANS). CALIFORNIA: Aguanga, 4 mi. w. Riverside, 24 April 1951, E. I. Schlinger, 1 female (Davis); Alamos Creek, San Luis Obispo Co., 22 June 1948, W. W. Wirth, 1 male, 1 female; Alpine Lake, 14 August 1957, A. L. Melander, 1 female; Barton Flats, August 1942, September 1950, 23 August 1952, A. L. Melander, 2 males, 3 females; Big Meadows, 30 July 1937, G. Spurlock, 2 females; Centerville, Fresno Co., 7 June 1965, P. Yost, 1 female (Riverside); Cisco, 5 June 1940; M. & H. James, 1 male, 1 female; Colfax, 20 May 1952, E. I. Schlinger (Davis); Crestline, 4 July 1942, A. L. Melander, 1 female; Deep Spring, Inyo Co., 16 July 1953, E. I. Schlinger, 3 males, 1 female (Davis); Dutch Flat, Placer Co., 20 May 1952, E. I. Schlinger, 1 female (Davis); Fallen Leaf, Eldorado Co., 6500 ft., 13 July 1961, J. G. Chillcott, 1 female (CAN); Glen Alpine, Lake Tahoe, 1 September 1930, H. H. Keifer, 1 female; Green Valley, 26 July 1944, A. L. Melander, 1 male, 4 females; Idyllwild, 7 June 1942, A. L. Melander, 1 male; Jenks Lake, 14 July, 24 August 1950, A. L. Melander, 3 females; Jacumba Springs, 28 June 1917, J. M. Aldrich, 4 females; Julian, 5 May 1945, A. L. Melander, 1 female; Kaweah River, Tulare Co., 12 October 1947, R. Coleman, 1 male; Keen Camp, 7 June 1942, A. L. Melander, 1 male, 3 females; Lake Tahoe, 11 August 1940, L. J. Lipovsky & D. E. Hardy, 2 males; Onyx, 7 mi. e., Kern Co., 12 June 1961, H. F. Howden, 1 female (CAN); Ortega Hwy., Mariana River, 19 October 1944, A. L. Melander, 1 female; Pacific, 9 August 1940, D. E. Hardy, 1 male, 1 female; Palm Springs, 19 November 1943, 4 October 1946, A. L. Melander, 2 males, 2 females; Pinecrest, Tuolumne Co., 13 August 1948, P. H. Arnaud, 1 male, 1 female; Riverton, 19 August 1953, E. I. Schlinger, 1 female (Davis); Siskiyou Co., 19 July 1948, W. W. Wirth, 1 male (CAS); Sardine

Creek, Mono Co., 6 July 1951, A. T. McClay, 2 females (Davis); Strawberry, Tuolumne Co., 20 July 1951, A. T. McClay, 1 male, 2 females; (Davis), Thorn, Mohave Desert, 30 May 1944; A. L. Melander, 1 male; Trinity River Camp, Trinity Co., 17 July 1953, A. T. McClay, 3 males (Davis); Tuolumne Meadows, 1 July 1940, D. E. Hardy, 1 male; Valyermo, 13 May 1934, A. L. Melander, 1 male, 4 females; Victorville, 12 May 1955, W. R. Richards & W. R. Mason, 2 males, 9 females (CAN); Whitewater Fish Hatchery, Riverside Co., 6 January 1953, P. H. Arnaud, 1 male, 2 females; Willets, 19 June 1935, A. L. Melander, 1 male; Yosemite Nat. Park, 1 August 1940, L. J. Lipovsky, 1 male, 27 June 1947, A. L. Melander, 1 female; Yuba Pass, Sierra Co., 20 August 1953, E. I. Schlinger, 1 male, 1 female (Davis). IDAHO: Caldwell, 2372 ft., 9 July 1926, C. Wakeland, 1 male (ANSP). MEXICO: Baja California, Sierra San Pedro Martir, La Grulla, 6900 ft., 12–15 June 1953, P. H. Arnaud, 14 males, 12 females; Rancho Viejo, 7000 ft., 13 June 1953, P. H. Arnaud, 3 females (CAS); Trail La Joya to La Zanja, 10 June 1953, P. H. Arnaud, 1 male, 1 female (CAS); El Salto, 9000 ft., 10 mi. w. Durango, 10 June 1964, J. F. McAlpine, 1 male, 3 females (CAN); same, 7 May 1961, Howden and Martin, 1 female (CAN). NEVADA: Beatty, 26 May 1940, G. E. Bohart, 1 female (CAS); Carson City, 25 May 1952, E. I. Schlinger, 1 female (Davis); Crystal Springs, Lincoln Co., 21 June 1953, A. B. Gurney, 1 male, 2 females; Reno, 20 October 1915, H. G. Dyar, 1 male. NEW MEXICO: Belen, 1 July 1947, L. D. Beamer, 1 male; Jemez Springs, June, September 1914, 2 males, 4 females (ANSP); Socorro, 1916 Williston Coll., 1 female; Rio Grande River, Taos Co., 6 July 1953, W. W. Wirth, 1 male. OREGON: Kerby, 18 September 1934, A. L. Melander, 2 males, 3 females (ANSP, USNM). UTAH: Kanab, 19 April 1935, A. L. Melander, 1 male.

This species is named in honor of Dr. Paul H. Arnaud, Jr., of the California Academy of Sciences in recognition of his extensive contributions to the dipterology of western North America. It is readily distinguished from the other North American species by the saturate black tarsi and the heavy black spines on the male tenth sternum.

Typopsilopa nigra (Williston), n. comb.

(Fig. 13)

Psilopa nigra Williston, 1896, Trans. Ent. Soc. London 1896:139, pl. 13, fig. 139 (female; St. Vincent I.; fig. head).

Typopsilopa flavitarsis Cresson, 1916, Ent. News 27:147 (Ariz.).—Cresson, 1946, Trans. Amer. Ent. Soc. 72:240 (dist.: Neotropical, Fla., Ga., La., and Ariz.).—Wirth, 1956, Amer. Mus. Novitates no. 1817, p. 17 (Bahamas). New synonymy.

Male, female.—Shining black; mesonotum and scutellum scoriaceous; tarsi bright yellow except tarsomere 5 brownish; wing grayish hyaline; halter knob white; frons and face less shining than in *atra*; opaque frontalia less differentiated; face

more or less irregularly wrinkled. Face longer than in *atra*, more tumid in middle, the long upper facials higher, about midway between epistomal margin and antenna. Antenna short, third segment only 1.2 times as long as greatest breadth; arista with 10 rays. Legs stouter than in *atra*, femora particularly stout; hairs on abdominal terga rather strong and dense. Second vein longer than in *atra*, costal index 1.37; fourth vein index 1.05. Wing 2.86 mm. long by 1.10 mm. broad.

Male genitalia as in fig. 13. Sternum VI heavily sclerotized and broad with distinct longitudinal wrinkles forming a boxlike ventral concavity within which the tenth sternum, surstyli, and processes of the hypandrium lie in repose. Sternum X large, slightly more than twice as broad as greatest length, the anteroventral margin with a broad rounded excavation mesad, the anterior margin on each side forming a broad, angulate lobe provided with fine, somewhat twisted hairs. Cerci normal, flaplike, setose. Surstyli gradually tapered to slender, bladelike processes, each with a row of minute setulae on ventral side; anteroventral processes of hypandrium slender blades lying between the surstyli on midline.

Distribution.—Arizona to Georgia, south to Brazil.

Types.—Psilopa nigra: 2 syntypes, St. Vincent I. (one is in the British Museum (Nat. Hist.), London and is here designated lectotype). *Typopsilopa flavitarsis*: holotype male, Bill Williams Fork, Arizona, F. H. Snow (KANS); also 3 male paratypes, same data.

Specimens Examined.—74 specimens, as follows: ARIZONA: Bill Williams Fork (Snow), holotype and 1 male paratype; Standfield (Butler). BAHAMAS: Andros I., Mangrove Cay (Hayden); Eleuthera I., New Portsmouth (Hayden and Giovannoli); Long I., Deadman's Cay (Hayden); San Salvador I., near Cockburn Town (Hayden). BRAZIL: Amazon River near Obidos (Holt, Blake, and Agostini); Gavea, Rio de Janeiro (Sousa Lopez). BRITISH GUIANA: Georgetown Bot. Gard. Exp. Sta. (Squire), bred from rice stool. CALIFORNIA: Needles (Kusche). COSTA RICA: Peralta (Calvert). DOMINICA: Cabrit Swamp (Wirth). DOMINICAN REPUBLIC: Samana (Sanchez). FLORIDA: Alachua Co. (Weems); Ft. Lauderdale (Melander); Hendry Co. (Morse); Little River (Knab); Miami (Knab). GEORGIA: Tifton. LOUISIANA: New Orleans (Plank); Slidell. MEXICO: La Bolsa (McGovran). NICARAGUA: Potosi (Woke). PANAMA: Ancon, C. Z. (Greene); Taboga I. (Busck). PUERTO RICO: Mayaguez. VIRGINIA: Warsaw, Richmond Co. (Wirth).

Discussion.—I examined the female syntype of *Psilopa nigra* Williston in the British Museum (Nat. Hist.) in 1957 and found that it was a *Typopsilopa*; at that time, a critical comparison with *flavitarsis* was not made. Characters given by Williston in the original description of *nigra* which agree well with *flavitarsis*: shape of face and antenna; position of the facials midway between epistomal margin and antenna; arista with 10–12 rays; legs black, all the tarsi yellow, with the distal joints blackish; second section of the costal vein about one-third longer than the third section; ultimate section of the

fourth vein only a little longer than the penultimate section; length 3 mm. These characters fit *flavitarsis* much better than *archboldi*, n. sp., the only other *Typopsilopa* species whose known distribution would bring it into consideration as Williston's species.

Typopsilopa archboldi Wirth, n. sp.
(Fig. 18)

Male, female.—Similar to *nigra* (Williston) but differing as follows: Foretarsus with only tarsomere 1 yellowish, 2–5 dark brown; face more tumid in middle; third antennal segment longer, 1.7 times as long as greatest breadth; arista with 8 rays; costal index 1.26; fourth vein index 1.08. Wing 2.56 mm. long, 0.96 mm. broad.

Male genitalia as in fig. 18. Sternum V short and bristly; sternum VI a massive, well sclerotized box-like concavity without longitudinal wrinkling; sternum X with narrow mesal bridge, anterior margin with low rounded bristly lateral lobes, the mesal excavation very gently rounded. Cerci large, each greatly prolonged ventrally in a heavily sclerotized, sharp spinelike point extending over mesal excavation of sternum X. Surstyli greatly bent near base in lateral view, distal portion slender and nearly straight, bearing 2 fine, distal setae and a few subapical hyaline spicules. Anteroventral process of hypandrium very stout, not divided, forming a subconical ventral protuberance.

Distribution.—Dominica, Puerto Rico.

Types.—Holotype male, allotype female, Cabrit Swamp, Dominica, 22–25 March 1965, W. W. Wirth, Bredin-Archbold-Smithsonian Biological Survey of Dominica (USNM 69527). Paratypes, 9 males, 9 females: DOMINICA: 7 males, 7 females, same data as types. PUERTO RICO: San German, 23 Dec. 1962, P. & P. Spangler, 2 males, 2 females.

This species is dedicated to Mr. John Archbold, in appreciation of his support of the Biological Survey of Dominica and his keen interest in the scientific exploration of the island.

Typopsilopa manni Wirth, n. sp.
(Figs. 16, 17)

Male, female.—Similar to *nigra* (Williston) but differing as follows: third antennal segment longer, 1.7 times as long as greatest breadth; foretarsi darker, tarsomeres 2–5 brownish; costal index 1.22; fourth vein index 1.28. Wing 2.56 mm. long, 0.95 mm. broad.

Male genitalia as in figs. 16, 17. Sternum V short, broad posteriorly, surface with short setose hairs; sternum VI heavily sclerotized, concaved ventrally forming a ventral pouch for the genital processes, narrowed posteriorly. Sternum X (fig. 17) greatly elongated, the bulbous lateral lobes as long as basal breadth of sternum, with a narrow, deep mesal cleft between the lobes nearly halfway to base of sternum; apices of lobes densely covered with short stout sharp spines on posteroventral side; anterodorsally each lobe drawn out in a finely setose flap ending in a distal point provided with 2 stout spines, this point not nearly as long as the rounded lobes. Cerci normal; flaplike. Surstyli (fig. 16) abruptly

bent near base, rather stout proximally, gradually narrowed to slender tip with small lateral point; anteroventral processes of hypandrium an appressed pair of slender pointed blades.

Distribution.—Bolivia; Argentina, Paraguay.

Types.—Holotype male, Rosario, Bolivia, Rio Rocagua, No. 1921, W. M. Mann, Mulford Biol. Exped. (USNM 69528). Allotype female, Argentina, Formosa, Mission Laishi, 13–15 Dec. 1948. Paratypes, 3 males: PARAGUAY: Incarnacion, 16 Jan. 1927, F. & M. Edwards, 1 male. San Bernardino, 1908, Fiebrig, 1 male (ANSP); same, Babarczy coll., 1 male.

This species is dedicated to Dr. William M. Mann in tribute to his early interest in entomology and his worldwide eminence as a zoologist.

Typopsilopa inca Wirth, n. sp.

(Figs. 14, 15)

Male, female.—Similar to *nigra* (Williston) but differing as follows: Third antennal segment long, 1.9 times as long as greatest breadth; arista with 12 rays; foretarsi darker, tarsomeres 2–5 brownish; costal index 1.25; fourth vein index 1.17. Wing 2.62 mm. long, 1.06 mm. broad.

Male genitalia as in fig. 14. Sternum V slightly longer than posterior breadth, surface with short setose hairs; sternum VI heavily sclerotized, concaved ventrally forming a ventral pouch for the genital processes. Sternum X (fig. 15) long and broad, quadrate in outline with a narrow anteromedian cleft extending to about a third of total length, the lateral lobes with broad truncate apical margins and bearing long bristly hairs on posteroventral and distal surfaces. Cerci normal. Surstyli slightly curved, tapering to slender tip bearing subapically 2–3 minute setae; anteroventral processes of hypandrium an appressed pair of hyaline blades slightly expanded distally in lateral profile.

Distribution.—Ecuador, Peru.

Types.—Holotype male, allotype female, Canete Peru, 17 May 1941, P. A. Berry (USNM 69529). Paratypes, 7 males, 7 females: ECUADOR: Loya, Catamayo, 1500 meters, 24 March 1965, L. Pena (CAN). PERU: 6 males, 6 females, same data as types; Loreto, Yarinacocha, 9–18 April 1963, L. Pena, 1 female (CAN).

This species is near *manni* n. sp. but differs markedly in the bristly instead of spinose armature of the more truncate lobes of the tenth sternum. The tenth sternum is more like that of *nigra* (Williston), but the lateral lobes are more truncate and the surstyli are slenderer, whereas *nigra* also differs in its pale tarsomeres 1–4 on the foreleg.

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STREPSIPTERA FROM THE SMITHSONIAN INSTITUTION'S SURVEY OF DOMINICA, WITH DESCRIPTION OF A NEW SPECIES OF ELENCHIDAE[1]

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Dr. Paul J. Spangler, Curator, Division of Coleoptera, United States National Museum (USNM) submitted for identification seven male Strepsiptera from the Smithsonian Institution's biological survey of the Island of Dominica. Six were Elenchidae belonging to a new species of *Pseudelenchus* Ogloblin (1925) and the seventh specimen provides a new record of *Corioxenos antestiae* Blair (1936).

The material preserved in fluid was first examined under magnification ranging from 10× to 80× since some of the structures can be more profitably observed before permanent mounting. This same range of magnification was employed for examination of the two dry mounts, one of which was in very poor condition, lacking both head and abdomen.

Slides were studied with a Wild M20 compound microscope having 10× oculars and 3×, 10× and 20× objectives, and its camera lucida attachment was used for accurate drawings.

I wish to acknowledge the professional help and encouragement in this study which has been given by my husband, Dr. Richard M. Fox. Both Mr. R. D. Pope of the British Museum (Natural History) and Dr. Paul Spangler at USNM have assisted me by checking some specific problems. Richard L. Satterwhite, our staff artist, as usual perfected my drawings for publication and Joseph Y. Quil finished the manuscript copy.

Family **Elenchidae** Pierce

In a recent paper (1967) I mentioned the disagreement among authors as to the exact diagnostic characters of the Elenchidae, the major character under discussion being the number of antennal segments. Five-segmented antennae were specified as diagnostic by Pierce (1907) who originally established the family with type-genus *Elenchus* Curtis, of which the type-species is *E. walkeri* (Curtis) (1831). I have not seen the holotype of *E. walkeri* which is in the Curtis Collection in Melbourne, Australia, but Mr. R. D. Pope of the British Museum (Natural History) kindly examined a paratype in the Dale Collection and reported (personal communication) that the antennae are clearly 5-segmented. *Elenchus solomonensis* Fox and *Elenchinus eastopi* Fox, which I described from the British Museum (Natural History) collection, both have five antennal segments. This

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is also true of at least 11 of the 16 species previously described under various genera of Elenchidae.

With 5-segmented antenna:

Elenchus tenuicornis (Kirby) (1815).
Elenchus walkeri (Curtis) (1829). Type-species of *Elenchus* by monotypy.
Elenchus templetoni Westwood (1835).
Deinelenchus australensis Perkins (1905). Type-species of *Deinelenchus* by monotypy.
Liburnelenchus (= *Mecynocera*) *koebeli* Pierce (1909). Type-species of *Liburnelenchus* by monotypy.
Elenchus melanias Perkins 1910.
Elenchus melanias silvestris Perkins 1910.
Liburnelenchus heidmanni Pierce (1918).
Elenchinus heidmanni Pierce (1918). Type-species of *Elenchinus* by monotypy.
Elenchinus japonica Esaki and Hashimoto (1931).
Sogatelenchus mexicanus Pierce (1961). Type-species of *Sogatelenchus* by monotypy.

With 4-segmented antenna:

Pseudelenchus carpathicus Ogloblin (1925). Type-species of *Pseudelenchus* by monotypy.
Elenchinus delphacophilus Ahlberg (*fide* Lindberg, 1939).
Elenchinus chlorionae Lindberg (1939).
Elenchus falcipennis Luna de Cavalho (1956).

Not known; publication unavailable:

Elenchus maorianus Gourlay 1953 (*fide* Kifune, 1964).

Under these circumstances it does not seem systematically sound to define the family, as did Bohart (1941), as having 4-segmented antennae, but rather to redefine it as possessing either 4 *or* 5, with species in at least two genera. Other diagnostic characters of the species described show too much similarity to justify establishment of another family.

Since the species described below has 4-segmented antennae, it should be assigned to *Pseudelenchus* Ogloblin (1925), type-species *P. carpathicus* Ogloblin, 1925, which is the only genus in the family based on a species with 4-segmented antennae.

Pseudelenchus spangleri, n. sp.
(Figs. 1–6)

Measurements are stated for the holotype and the averages for specimens seen are given in parentheses.

Male: Body, light brown, 0.95 mm. long (0.84 mm.); hindwing, 1.0 mm. broad (0.95 mm.) with expanse of 2.2 mm. (2.0 mm.); width of head between eyes, 0.15 mm.

Head: Squared vertex. 4-segmented antenna set laterally well in front of eyes; segment I prominent, about same size as II; III is branched with tip of

flabellum reaching slightly beyond middle of IV. Eye with 4 large ocelli visible dorsally on inner rim, probably 12–16 total. Mouthparts with very stout mandible somewhat rounded apically, a third longer than distal segment of maxillary palpus; 2-segmented palpus with proximal segment two-thirds length of distal one.

Metathorax: prescutum with sharply triangular posterior and rounded anterior margin protruding beyond that of the scutum, well separated from scutellum. Scuti with defined sutures separating them from membranous portion above the broad, almost rectangular scutellum. Large, bandlike postlumbium. Postscutellum about three-fourths the length of anterior metathoracic sclerites.

Forewing: Small paddle-shaped structure.

Hindwing: 5 main veins. C and Sc coalesced for part of their length and appearing to be a single strong vein; R very short with single detached vein below; M_1 and M_2 about equal length; single A.

Legs: All with 2-segmented tarsus. Midleg with slender femur longer than tibia (7:5). Hindleg with femur much stouter than, and equal in length to, tibia. First tarsal subsegment in all legs broader and twice the length of terminal one.

Aedeagus: Quite thick for over half its length then tapering evenly to pointed apical tip; diagonal rows of tiny bristles on proximal third.

Abdominal segment X: Short with tapered posterior margin.

Female, larva and host unknown.

Holotype male: Clarke Hall, Dominica, Malaise trap, 15 October 1964, Spangler; USNM 70069. 4 paratype males divided with two slides at CM, 2 slides and 1 dry mount at USNM. A damaged dry mount, probably this species, USNM, not included in type-series.

Discussion: There are several characteristics which separate this species from *P. carpathicus* Ogloblin. *P. spangleri* is much smaller (0.8 mm.: 1.5 mm.); the metathorax is longer than the abdomen; the postlumbium is not so broadly curved; the head is narrower with eyes closely set, not slightly pedunculate. Ogloblin states that there are only four main veins in the hindwing while *P. spangleri* shows five. However, his figure indicates that this apparent discrepancy is a matter of terminology since he seemed to consider C and Sc as a single vein.

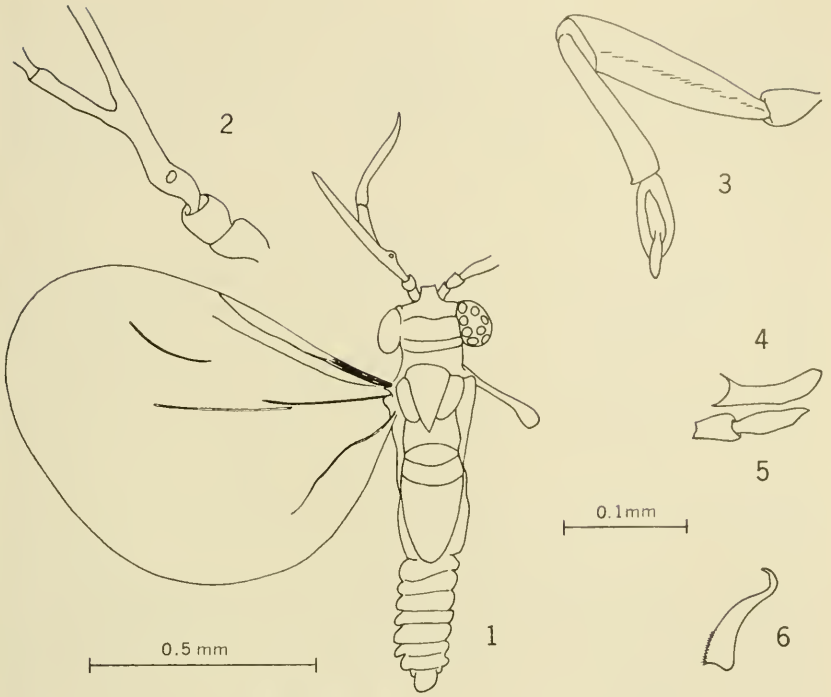
This species is named in honor of the collector, Paul J. Spangler.

Corioxenos antestiae Blair (1936)

Single male specimen, Cabrit Swamp, Dominica, 18 July 1964, O. S. Flint, USNM.

The specimen was examined in fluid before mounting. Due to an accident, the material on the slide was disoriented and contaminated with dust, but efforts to repair it might have resulted in further damage to this sole specimen and were avoided. Basic structures can be observed, and although the aedeagus is broken, its tip shows under the edge of the left hindwing.

There are no bristles along the aedeagus of this specimen, nor were



Figs. 1–6. *Pseudelenchus spangleri*, n. sp.: 1, body showing antenna and wing in dorsal aspect; 2, detail of antennal segments; 3, hindleg; 4, mandible; 5, maxillary palpus; 6, aedeagus. (Figs. 2–6 use 0.1 mm scale.)

there any found by Blair, but Kirkpatrick (1937) noted aedeagal bristles in the extensive material he studied. It is also smaller than the fresh African specimens studied by Kirkpatrick which is doubtless due to the rapid shrinkage of dead material. The wide gap in distribution between the slopes of Kilimanjaro and the swamps of Dominica may well be accounted for by the probability that *antestiae*'s host, a pest on coffee, was imported from Africa along with the coffee tree seedlings for Dominican plantations.

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A NEW SPECIES OF THE GENUS MACROCEPHALUS SWEDERUS FROM MEXICO

(Hemiptera : Phymatidae)

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Through the kind offices of Dr. Joseph C. Shaffner, Associate Professor at the Texas A. & M. University, College Station, Texas, I have had the privilege of examining a small lot of *Macrocephalus* Swederus from the southern United States and Mexico, for which I express to him my sincere thanks.

In this lot were six known and one new species. Five of the species are common in this area: *M. cimicoides* Swederus, five specimens

from Texas; *M. incisus* Stål, seven specimens from Mexico; *M. prehensilis* (Fabricius), 12 specimens from Mississippi, Missouri and Texas; *M. stali* Handlirsch, three specimens from Texas and Mexico. The rare Mexican species *M. spiculosus* Champion was represented by a lone specimen from Simojovel, Chiapas. The new species is described below.

Macrocephalus (Lophoscutus) spiculiger, n. sp.
(Fig. 1)

Male. Closely related to *M. lepidus* Stål and running to it in the Handlirsch's key for *Macrocephalus* species (1897:182). It is of the same shape and color, only the male has more black color, and less brown, and the size is slightly smaller (5.5 mm.). The main differences are: fore disc of pronotum in both sexes with small, sharp, erect, black spicules instead of round granules; antero-lateral-anterior borders of pronotum finely denticulate, bearing yellow spicules instead of rounded granules, the spicules slightly longer and not so sharp as those on fore disc. Other characters as in *M. lepidus*.

Head cylindrical, brown, densely covered with fine, sharp, black granulation. Antennae of male with segments I and IV black, II and III brown with black spot; of female, I–III orange yellow, IV green.

Pronotum with anterior border sinuate; antero-lateral angles acute, slightly divergent; antero-lateral-anterior borders straight, convergent forward, denticulate; lateral notch shallow, sinuate; antero-lateral-posterior borders convex, rounded, very finely granulate; lateral angles barely incised; postero-lateral borders deeply sinuate; posterior angles small, acute; posterior border convex, rounded medially. Fore disc moderately inflated, declivous, brown with dense, erect, sharp, black spicules; antero-lateral-anterior borders, and lateral notch, pale yellow; postero-lateral borders rimmed with white; rest of pronotum black. In the female, black color replaced by testaceous, only spicules on fore disc black. Hind disc roughly punctured.

Scutellum tongue-shaped, reaching slightly over the tip of abdomen in both sexes. Median carina linear (*Lophoscutus* type), clearly visible, deeply depressed base pale yellow, elsewhere convex (in the female greenish-yellow). Disc very roughly punctured at base, punctures progressively diminishing toward tip, there one-fourth as large. Color: base, large elongate ovate spot in the middle of disc, transverse band, and apical portion, black, all 3 spots contiguous with one another; 2 (1 + 1) lateral spots on fore half, and 2 (1 + 1), larger lateral spots on hind half, pale yellow, with exception of 6 (3 + 3) small spots on the latter, which also are black. In female, black color replaced by testaceous; lateral borders of hind half, and tip of disc testaceous with a few round, brown dots.

Corium black, exterior border pale yellow. In female, testaceous and greenish yellow. Disc with fine, whitish granules.

Abdomen strongly rounded laterally, more so in female. Connexivum wide and horizontal; connexivum II in both sexes with a narrow, reflexed edge slightly produced beyond outer border of connexivum III, other PE-angles of connexiva not protruding.

Ventral side: head yellowish green, rostrum green, pleurae and sternum orange yellow, venter and legs pale yellow to green; fore tibiae, tips of median and hind

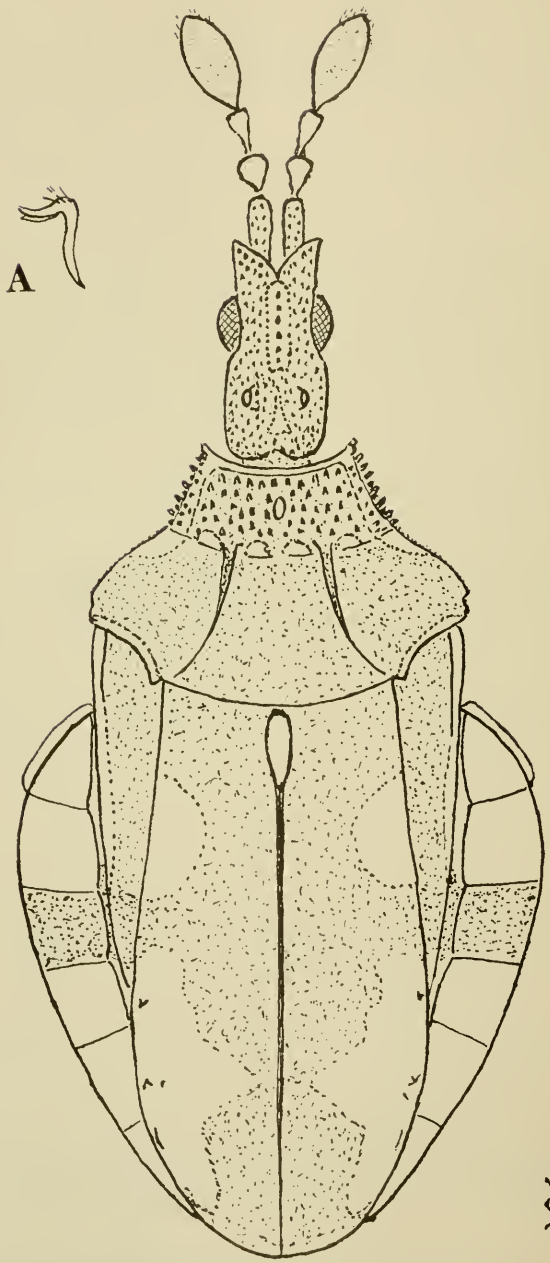

Fig. 1. *Macrocephalus* (*Lophoscutus*) *spiculiger*, n. sp., ♂. A = right paramere.

tarsi, and spots on connexivum IV, blackish. Fore tarsi absent. Paramere of type in subgenus *Lophoscutus*.

Measurements: first figure in ratios represents the length and the second the width of measured part, 25 units equal to 1 mm. Head: ♂—29 : 17.5, ♀—30 : 18; relative length of antennal segments, I to IV, are: ♂—9(5) : 5(3.5) : 6(3) : 14(6), ♀—8(4.5) : 4(3.5) : 5.5(3) : 10(5.5), figures in parentheses represent maximum width of segment; pronotum: ♂—35 : 52 (maximum width across fore lobe 25), ♀—34 : 52.5 (maximum width across fore lobe 29); scutellum: ♂—73 : 40, ♀—73 : 40; abdomen: ♂—75 : 68, ♀—71 : 72 (maximum width in both sexes is across segment III).

Total length: ♂—5.52, ♀—5.40 mm.; width of pronotum: ♂—2.08, ♀—2.10 mm.; width of abdomen: ♂—2.72, ♀—2.88 mm.

Holotype: ♂, MEXICO, Guerrero, 6 mi W of Iguala—P. M. & P. K. Wagner collectors, 10.VII.1966; USNM 69955.

Allotype: ♀, MEXICO, Guerrero, 12 mi S of Chilpancingo, same collectors, 12.VII.1966; in the U. S. National Museum collection.

Reference

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NOTES ON THE SYSTEMATICS AND MORPHOLOGY OF THE LACEBUG SUBFAMILY CANTACADERINAE

(Hemiptera: Tingidae)

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Deposition of the Carl J. Drake collection of Hemiptera-Heteroptera in the U. S. National Museum, especially the remarkably complete accumulation of known taxa of lace bugs, provided a unique opportunity to prepare a needed key to the tingid genera of the world. Based on that collection, the recent Drake and Ruhoff (1965a) catalogue, and appreciated help from NSF grant GB-791, such a key is being constructed. The necessity for changes and additions to the information in that catalogue and the desire to keep the generic key in a certain format leads me to early publication of changes and descriptions of new taxa.

The subfamily Cantacaderinae appears to be a natural and valid group whose included genera fall into two categories characterized by Drake and Davis (1960:78) as the tribe Cantacaderini with a "stenocostal area" (the single outermost row of cells of the costal area

set off by a thickened vein) and the tribe Phatnomini lacking the stenocostal area.

My attempts to verify the correct tribal placement of the included genera revealed that the dorsal evidence of the stenocostal area was matched by a more complex development ventrally which could be present without evident dorsal expression.

The ventral development of the stenocostal area (fig. 1) consists of the outer row of cells being confined between two thickened veins which subbasally curve abruptly mesad and continue a parallel course with a narrow groove between them. The inner end of this groove disrupts the hypocostal lamina (uninterrupted in other Tingidae) and is directly in line with the peritreme extending from the scent gland opening. Such morphological alignment and possible functional interdependence imply a complex genetic control during the formative period. This ventral expression of the "stenocostal area" confirmed all tribal assignments of genera in the Drake and Ruhoff (1965a) catalogue except that of *Stenocader* Drake and Hambleton whose lack of dorsal expression of the stenocostal area led to its placement in the Phatnomini. The ventral modifications are, however, very strongly developed on *Stenocader* so it is here transferred to the tribe Cantacaderini.

Cyclotynaspis Montandon

Cyclotynaspis Montandon, 1892:265.

Cyclotynaspis acalyptoides Montandon

Cyclotynaspis acalyptoides Montandon, 1892:265.

This species was known only from the Singapore holotype for more than 70 years. Fortunately it recently was rediscovered by Dr. D. H. Murphy, University of Singapore, who found six adults and one nymph during his study of the forest litter fauna in Singapore. Study of this series confirms the Drake and Ruhoff placement of the genus in the tribe Phatnomini. The type and all adults studied were females.

Gonycentrum Bergroth, rev. gen.

Teleia Fieber 1844:56. Preoccupied by *Teleia* Hübner, 1825, in *Lepidoptera*.
Gonycentrum Bergroth, 1898:9.
Malala Distant, 1910:101. **New synonymy.**

Diagnosis: This is the only genus of the tribe Phatnomini with the combination of the exposed scutellum and a long, slender, horizontal spine directed forward above each eye.

Type species: of *Teleia* Fieber, *T. coronata* Fieber, monobasic; of *Gonycentrum* Bergroth, *Teleia coronata* Fieber, objective synonymy; of *Malala* Distant, *M. bulliens* Distant, monobasic and original designation.

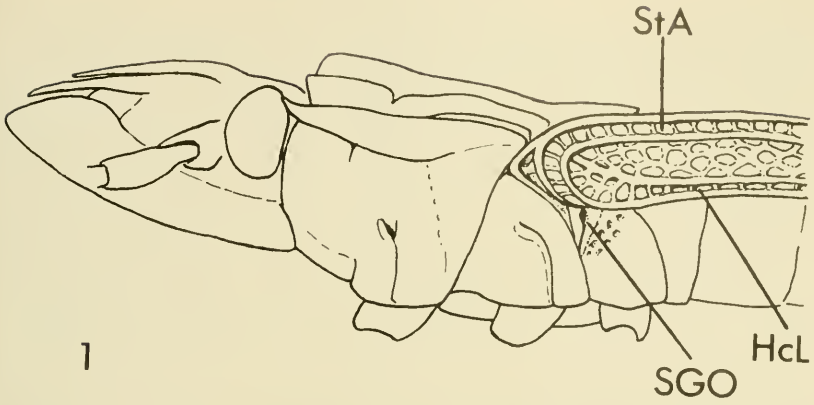

Fig. 1, *Cantacader quadricornis* (Le Peletier and Serville). Lateral view of head, thorax and bases of wing and abdomen. HcL = hypocostal lamina; SGO = scent gland opening; StA = stenocostal area.

Comments: In the Drake and Ruhoff (1965a) catalogue, *Gonycentrum* contained 12 species from three different zoogeographic subregions: Ethiopian, Oriental and Australian. During the search for characters with which to construct a key to the species, it soon became evident that certain head structures, which are generically important throughout the family, were associated with the species from each zoogeographic subregion suggesting that this was a composite genus.

The name *Gonycentrum* must follow the type species of the preoccupied name *Teleia* which it replaces. Thus the concept of *Gonycentrum* is returned to its original monobasic status containing one Oriental species.

For the other two groups of species formerly assigned to the inclusive use of *Gonycentrum*, the name *Sinalda* Distant can be resurrected from synonymy for the species of southern Africa, and a new genus must be proposed for those from the Australian Region; for the latter I propose below the name *Carldrakeana*.

The genus *Malala* also becomes involved with *Gonycentrum* because both genera are based on the same species. Subsequent to their catalogue, Drake and Ruhoff (1965b) described *Malala charieis* from New Guinea. Unfortunately, this species cannot follow *Malala bulliens* Distant into *Gonycentrum* because it is generically distinct. In fact the lack of paired spines on the vertex combined with certain other structures prevents its assignment to any known genus. A new genus, *Distocader*, is proposed for it below.

To summarize all the generic changes necessitated by this redefini-

tion of *Gonycentrum*, a key to the pertinent genera is offered below and followed by the necessary generic discussions and descriptions:

1. Head with a prominent tubercle on median line between eyes 2
   Head without a tubercle on median line between eyes 3
2. Head with 3 tubercles on vertex, a median one and one above each eye (South Africa) ..... **Sinalda** Distant
   Head with one tubercle on vertex, the median one, none above eyes (New Guinea) ..... **Distocader**, n. gen.
3. Vertex with a long slender spine arising near base above each eye and extending horizontally and anteriorly to or beyond anterior margin of eye ("Ostindien," India, Ceylon) ..... **Gonycentrum** Fieber
   Vertex without spines or tubercles above eyes (Australia, New Guinea) ..... **Carldrakeana**, n. gen.

Considering the good figure of *Teleia coronata* given with the original description by Fieber and the proximity of the type localities of *coronata* and *Malala bulliens*, it is quite surprising that Distant and all subsequent workers failed to recognize that both names belong to the same species. The fact that both Fieber's and Distant's excellent illustrations show the uncovered scutellum and the long, supraocular spines on the vertex leaves no other conclusion but synonymy as this combination is known in no other tingid. Drake and Ruhoff's (1965b:244) placement of their species *charieis* in *Malala* appeared to result from the superficial similarity of their species to *bulliens*, but the head armature makes this untenable and forces the creation of a new genus for their species.

List of Species of **Gonycentrum**

coronata (Fieber), 1844, p. 56—*Teleia*, [Bergroth, 1898, p. 9]. "Ostindien."
= *Malala bulliens* Distant, 1910, p. 101. **New synonymy**. Ceylon.

Sinalda Distant, rev. gen.

Sinalda Distant, 1904:426.

Diagnosis: Among those genera of the tribe Phatnomini bearing a spine or prominent tubercle on the midline of the vertex, *Sinalda* may be recognized by also having paired spines or tubercles on the vertex and no lobular or spinelike projections on the horizontal or slightly oblique (not recurved) paranota.

Type of genus: *Sinalda elegans* Distant, subsequently designated by Monte (1947:4).

Sinalda was made a synonym of *Gonycentrum* by Drake (1950:165). When the present study found *Gonycentrum* to contain three groups of species distinguishable on certain head structures coupled with geographic distribution, *Sinalda* was available as the generic name for the species of southern Africa (see above treatment of *Gonycentrum* for details).

Eight of the previously described species of lace bugs plus one new one belong to *Sinalda*.

Sinalda haplotaxis, n. sp.

Diagnosis: Among the named macropterous forms within the genus, this species is distinguished by the costal area containing only a single row of subquadrate areolae (except in basal fifth) which are distinctly larger than the areolae of the subcostal area. It appears to be closest to *thomasi* (Drake) in which the costal area has two or three rows of areolae for full length.

Characters: Holotype male, length 2.3 mm.; macropterous. Head dorsally with 8 stout cephalic tubercles: one pair each on juga, above clypeus, and above eyes, plus a single tubercle each medially on the vertex and clypeus; bucculae low (less than half the height of an eye), uniseriate, slightly surpassing and in contact beyond apex of clypeus; labium reaching between hind coxae; antennal segment I little stouter and longer than II, segments III and IV missing.

Pronotum without inflated cysts, anterior margin weakly concave, slightly convex behind eye; disc with 3 longitudinal carinae plus vague, longitudinal calloused swelling above each humerus; paranota distinctly wider than tibial diameter, with 2 rows of areolae from humeri forward, outline constricted opposite calli; posterior margin transverse, nearly straight, exposing scutellum. Elytra nearly flat (most of left one missing, areas well defined by elevated prominent veins; costal and subcostal areas subdivided by two and four, respectively, elevated thickened crossveins; costal area narrow, with 1 regular row of subquadrate areolae (except in basal fifth) larger than areolae of subcostal area. Scent gland opening obscure, without elevated auricular peritreme. Sternal laminae straight, parallel on all three thoracic sterna. Abdomen somewhat longitudinally impressed mesoventrally near base.

Holotype male: Transvaal, December 30, 1956, A. L. Capener (USNM 69913, in Carl J. Drake collection).

The species name is derived from two Greek words meaning "single" and "row" and reflects the virtually wholly uniseriate costal area.

List of Species of **Sinalda**

aethiops (Distant) 1902, p. 238—*Phatnoma*. **New combination**. South Africa.
afra (Drake and Ruhoff), 1961, p. 126—*Gonycentrum*. **New combination**. South Africa.
angustata (Drake), 1956, p. 15—*Gonycentrum*. **New combination**. Tanganyika.
elegans Distant, 1904, p. 428—*Sinalda*. **Restored combination**. South Africa.
haplotaxis, new species (see above). Transvaal.
nebulosa Distant 1904, p. 428—*Sinalda*. **Restored combination**. South Africa.
reticulata Distant, 1904, p. 427—*Sinalda*. **Restored combination**. South Africa
testacea (Distant), 1902, p. 238—*Phatnoma*. **New combination**. South Africa.
thomasi (Drake), 1956, p. 14—*Gonycentrum*. **New combination**. Kenya.

Distocader, n. gen.

Diagnosis: Among those genera of the tribe Phatnomini bearing a cephalic spine or tubercle on the midline of the vertex, this one can be recognized by having no pairs of spines on the vertex and no lobular or spinelike projection on the margin of the oblique paranotum.

Characters: Head with 6 tubercles (a pair above base of clypeus, a pair of weak tubercles on juga, one each on midline of vertex and clypeus); eyes more

than half as wide as interocular space; bucculae reaching apex of clypeus, not incurved anteriorly; labium reaching between hind coxae; antennae (missing from only available specimen, character derived from original illustration of type species) with segment III about 5 times as long as I plus II.

Pronotum without inflated cysts; anterior margin weakly concave; disc tricarinate, median complete, percurrent, dorsal outline angularly emarginate above calli, lateral simple, reaching to calli; paranota obliquely elevated, biseriate except around humeri where uniseriate; posterior margin transverse, nearly straight, exposing scutellum. Elytra conjointly weakly convex; areas separated by thickened veins; vein between discoidal and subcostal area elevated, containing a row of subquadrate areolae; subcostal area quadriseriate, costal area weakly oblique, biseriate for nearly full length; hypocostal lamina uniseriate. Sternal laminae present, low, areolate on all thoracic sterna, diverging on metasternum. Peritreme elevated, transversely oval auricle. Abdomen convex basomedially.

Type of genus: *Malala charieis* Drake and Ruhoff, present designation.

Geographic distribution: The lone known specimen was from New Guinea.

Comments: In the absence of any outstanding feature to be signaled by the generic name, the Latin word *disto*, meaning "be separate" or "differ" is combined with "cader" which is commonly used as a suffix in generic names in this subfamily.

List of Species of **Distocader**

charieis (Drake and Ruhoff), 1965:244—*Malala*. **New combination**. New Guinea.

Carldrakeana, n. gen.

Diagnosis: This genus may be recognized within the tribe by the combination of no interocular spines or tubercles, the narrow, straight, slightly oblique, areolate paranota, and the costa gradually widening from the base.

Characters: Head with 4 dorsal cephalic spines (a pair above base of clypeus, one on each jugum); eyes almost half as wide as interocular space; bucculae far surpassing apex of clypeus, anteriorly incurved and usually touching each other; labium reaching base of abdomen; antennal segment III 3 to 4 times as long as I plus II.

Pronotum without inflated cysts; anterior margin transverse, nearly straight; disc with 1 or 3 longitudinal carinae, median percurrent, lateral carinae, when present, percurrent, interrupted above calli; paranota flat, somewhat oblique, narrow, with 1 or 2 rows of areolae; posterior margin weakly convex to truncate across middle third, exposing scutellum. Elytra conjointly convex; areas distinctly delimited by elevated veins; discoidal and subcotsal areas usually interrupted by prominently elevated cross veins; costal area oblique, narrow, gradually widening from base, with 1 or 2 rows of areolae. Scent gland opening not visible, without elevated peritreme. Abdomen with midventral groove restricted to segments I and II, former with a spinelike prominence on each side of groove.

Type of genus: *Phatnoma tindalei* Hacker, present designation.

Geographic distribution: *Carldrakeana* occurs in Australia, Tasmania, New Guinea, and New Zealand.

Comments: This taxon is that part of the genus *Gonycentrum*, in the broad sense, characterized by the absence of spines or tubercles between the eyes. For further discussion of this genus, see the comments under *Gonycentrum*.

As is evident, the name proposed for this genus is a dedication to the late Dr. Carl John Drake who, in a half century of studying lacebugs, contributed many important papers and crowned his activities on the group with coauthored elucidations on their morphology and phylogeny (Drake and Davis 1960) and a world catalogue (Drake and Ruhoff 1965a) of the taxa involved.

Carldrakeana was misidentified as *Cyperobia* by Drake and Davis (1960:29, fig. 31) and Woodward (1961:155, figs. 18 and 19) who published illustrations of specimens under the name *Cyperobia carectorum*. The lack of an inflated "vesicle" or cyst anteriorly on the pronotum, which was very clearly characterized in Bergroth's original description of *Cyperobia*, prevents considering these figures as representatives of that genus. In fact, Drake and Davis' sketch and Woodward's figure 19 both show *Carldrakeana scoia*, a conclusion which in part is confirmed by examination of two of Woodward's Stokes Valley specimens now at hand. Woodward's figure 18 clearly runs to *Carldrakeana* but presents a combination of characters unlike that found in any of the three species known within the genus.

List of Species of **Carldrakeana**

engista (Drake and Ruhoff), 1961:127—*Gonycentrum*. **New combination**. New Guinea.

socia (Drake and Ruhoff), 1961:128—*Gonycentrum*. **New combination**. Tasmania.

tindalei (Hacker), 1928:177—*Phatnoma*. **New combination**. Australia.

Minitingis Barber, rev. gen.

Minitingis Barber, 1954:7.

Diagnosis: Within the tribe Phatnomini, only this genus and *Gonycentrum* (in the restricted sense used above) possess seven spines on dorsum of head and a long labium reaching to second abdominal sternite. In *Gonycentrum* the spines above the eyes lie on the surface of the head and project horizontally and anteriorly to or beyond the anterior margin of the eye; in *Minitingis* these spines are much shorter and obliquely elevated.

Type of the genus: *Minitingis minusculus* Barber, monobasic.

Comments: Drake and Ruhoff (1960:28) synonymized *Minitingis* under *Zetekella*. Considering only the three species catalogued under that genus by Drake and Ruhoff (1965a) I tentatively accepted this synonymy. But the appearance of a second West Indies species agreeing with *minusculus* in the narrow form, head armature, long labium, paranotal development, and grooved abdomen created a

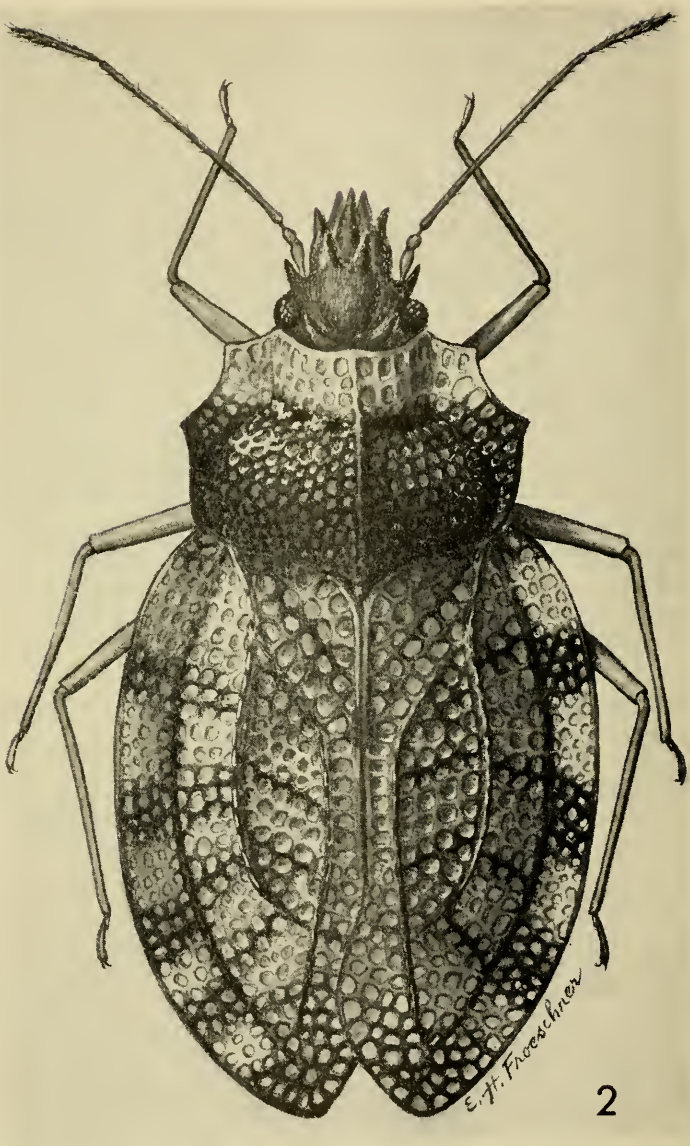

Fig. 2, *Minitingis elsae*, n. sp.

distinct morphological pattern of West Indies versus continental American species. This pattern appears to have true zoogeographical significance best represented at this time by generic recognition; so Barber's genus is here resurrected for these two species.

Minitingis elsae, n. sp.
(Fig. 2)

Diagnosis: The conspicuous black and white color pattern is distinctly unique within the subfamily. Structurally this new species can be separated from the only other member of the genus by the greater number or rows of areolae (4 in contrast to 2) in the costal area.

Characters: Holotype male. Length 2 mm.; brachypterous. Head with 7 dorsal spines (one pair each above eyes, above base of clypeus and on juga, plus 1 medially at midlength of clypeus); antennophores anterolaterally prolonged into prominent spines; bucculae slightly surpassing apex of clypeus; antennal segment II shortest, I slightly longer, III about 5 times as long as I plus II, IV slightly thickened, about one-third as long as III; labium reaching apex of abdominal sternite II.

Pronotum without inflated cysts; anterior margin concave; disc unicarinate, median carina percurrent, elevated, areolated, dorsal margin angularly incised between calli; discal surface including collar but not calli, densely, subcribrately punctured; paranota developed full length, narrow, 3 areolae wide opposite calli, lateral margin with a weak angulation subapically and submedially; posterior margin transverse, weakly convex medially, exposing small scutellum. Elytra conjointly weakly convex; areas separated by thickened veins; vein between subcostal and discoidal areas laminately elevated and areolated almost to apex, vein separating discoidal and sutural areas similarly developed except basally between discoidal and claval regions where it becomes almost obsolete; discoidal and subcostal areas subdivided by thickened cross veins; costal and subcostal areas 4 areolae wide for full length; clavocorical suture obliterated, claval commissure distinct, elevated. Scent gland opening surrounded by strongly developed auricular peritreme. Sternal laminae on all segments uniseriate, straight, nearly parallel. Abdomen strongly impressed along basal third of midline.

Head and body black; collar dorsally and laterally, apical third of paranota, sternal laminae, metapleura, including peritremes, ivory white; heleytron ivory white, marked with dark fuscous or black as follows: Narrow base and 3 or 4 quadrate areas in costal area; lines along subdividing cross veins and nearby veins of subcostal and discoidal areas; and veins of sutural areas. Antennae and legs brownish.

Holotype ♂. Jamaica, intercepted on air freight being carried into the United States on September 19, 1966 (USNM 69914).

This beautiful little lace bug is dedicated to my dear wife, Elsie Herbold Froeschner, for her years of understanding and cooperation in my entomological pursuits and her willingness to beautify and increase the usefulness of my papers with her skillfully executed illustrations.

LIST OF SPECIES OF **Minitingis**

elsae, new species (see above). Jamaica.
minusculus Barber, 1945:7—*Minitingis*. **Restored combination**. Bahamas Is.

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ERRATUM

Vol. 70(2):163. Change first line under CONCLUSIONS to read "1. Our North American *Polyergus rufescens* should be considered as one . . ." [J. Wheeler, Male genitalia and the taxonomy of Polyergus].

THE GENUS SOMATIA SCHINER, II.
(DIPTERA: SOMATIIDAE)

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The genus *Somatia* Schiner is the only genus included in the rather isolated family Somatiidae, which is restricted to the Neotropical Region. In 1958 the family was first found to contain species other than *Somatia aestiva* (Fabricius), when I added two species (Steyskal, 1958). Nelson Papavero added two more species (Papavero, 1964), and I take the opportunity here to add another two species, as well as to present a few notes, before compiling the fascicle on this group for the Catalogue of the Diptera of the Americas South of the United States.

Somatia papaveroi, n. sp.

Female. Length of wing 4.56 mm. Similar to *S. sophiston* Steyskal, as shown in the key below, but differing as follows.

Wing with cell *Sc* largely hyaline, only small area in tip and base near crossvein *h* brown; basal brown fascia complete to hind margin and filling base of anal cell; median fascia in region of fork of *Rs* not developed; cell R_2 largely hyaline, brown narrowly along R_1 near base and along *C* near tip, the color gradually broadening to fill out tip of cell; brown color in tip of cell M_1 broad along R_{4+5}, but hardly attaining M_1.

Thorax largely yellow, only the following black markings developed. Three longitudinal stripes in presutural area, tapering out before transverse suture, but middle stripe faintly indicated posterad of suture; large lateral scutellar spots, not attaining base, separated by two-thirds of their width, and including wart-like bases of 4 marginal bristles.

Abdomen including postabdomen, largely yellow, only the following black marks present. Pair of rather narrow, arcuate, basilateral marks on tergum 2; pair of round spots dividing width of tergum 3 into 3 equal parts. Narrow, inconspicuous, light brown, oblique stripes are present just within the lateral margins of terga 3–6.

Male. Length of wing 5.2 mm. Similar to female, except that sublateral prescutellar mesoscutal black stripes are followed by a round black spot a short distance behind the transverse suture; median stripe also well developed from transverse suture posterad for two-thirds of distance to scutellum; and submedian spots of tergum 3 are small and brown rather than black, but the lateral marks of terga 3–6 are lenticular and black.

Holotype, female, San Esteban, Venezuela, November, 1939 (Pablo Anduze), USNM 69868; allotype, male, Cachicote, Huanuco, Peru, 5 September 1965 (J. C. Hitchcock, Jr.), notebook no. 92, also in U.S. National Museum. It is possible that the allotype represents a distinct species, but in view of the variation in color encountered in other species, I am inclined to consider it conspecific with the Venezuelan

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female. I am gratified to dedicate this species to Nelson Papavero in recognition of his work on this group.

Somatia schildi, n. sp.

Male and female. Length of wing 3.6–4.0 mm, type and allotype largest. As shown in the key below, most similar to *S. aestiva* (Fabricius), differing as follows.

Head with occiput above foramen nearly wholly piceous, yellow only in pair of narrow sutural stripes (in *S. aestiva* this area is largely yellow, with at most 3 well separated piceous spots).

Thorax with mesoscutal marks extending from two-thirds of distance from transverse suture to scutellum or in some cases almost attaining scutellum; pleura with large blackish spot covering most of sternopleuron and pteropleuron and about half of mesopleuron; metanotum (postscutellum, mediotergite) wholly blackish or yellowish with blackish lateral stripes.

Wing with basal brown fascia not extending below *Cu* into base of anal cell; free part of M_4 considerable, extending more than halfway from lower corner of discal cell to wing margin (scarcely more than a stub in *S. aestiva*).

Abdomen with black pattern more extensive than in *S. aestiva*; black stripe along posterior edge of tergum 1; black lateral marks of tergum 2 occupying most of tergum and only narrowly separated medially; submedian marks of tergum 3 large, separated from each other by less than their width; submedian marks of tergum 5 lacking (small ones usually present in *S. aestiva*).

Holotype (male) and allotype, La Suiza de Turrialba, Costa Rica, December (Pablo Schild); paratypes: same locality and collector, 2 males and 1 female, March, 1926; 1 male, June, 1926; 1 male, September 1924; one pair, Pedregosa, Costa Rica (D. L. Rounds); USNM 69869, received with the A. L. Melander collection. This species is dedicated to the collector of the largest part of the material, Pablo Schild, in recognition of his extensive material additions to our knowledge of Central American insects.

Somatia sophiston Steyskal

A small series of specimens from Venezuela differs from the type from Guatemala and three additional specimens from Ancon, Canal Zone, Panama, in reduced black marking of the body. The lateral scutellar spots are reduced or even completely lacking and the spots on the abdomen are smaller, the lateral ones virtually absent in the palest specimens. The Venezuelan material, which may be eventually found subspecifically distinct, consists of one female from San Esteban, November, 1939, and two pairs from Valle Seco, Carabobo, January, 1940, all collected by Pablo Anduze and in the U.S. National Museum collections.

KEY TO THE SPECIES OF THE GENUS **Somatia** SCHINER

1 (6) Scutellum not wholly black, with pair of black marks separated by median yellow stripe or even wholly yellow; brown median fascia of

wing sometimes developed from *C* to point well behind node of fork of *Rs*.

2 (3) Sternopleuron with blackish mark; cell R_2 hyaline except apically; basal fascia of wing not extending posterad into base of anal cell; scutellum with broad lateral black marks and sometimes black basal margin ..... **S. carrerai** Papavero

3 (2) Pleura wholly yellow; cell R_2 nearly wholly dark brown or largely hyaline; basal brown fascia complete from crossvein *h* to posterior margin; scutellum sometimes wholly yellow.

4 (5) Cell R_2 nearly wholly dark brown; cell *Sc* brown from *h* to end of *Sc*; median fascia developed from end of *Sc* over basal crossvein to *Cu*; scutellum with 6 bristles, including small subbasal pair, and sometimes wholly yellow ..... **S. sophiston** Steyskal

5 (4) Cell R_2 largely hyaline; cell *Sc* mostly hyaline, brown basally near *h* and in tip; scutellum with large black lateral marks including well developed warts at bases of the 4 bristles ..... **S. papaveroi**, n. sp.

6 (1) Scutellum nearly wholly black, yellow only laterally at extreme base; median wing fascia not developed posterad of fork of *Rs*.

7 (8) Cell R_2 hyaline except at tip; basal brown fascia of wing complete; median black mesoscutal stripe broadened posteriorly and attaining scutellum ..... **S. australis** Steyskal

8 (7) Cell R_2 nearly wholly dark brown; basal fascia complete or not; median mesoscutal stripe attaining scutellum (mesoscutum largely black) or not.

9 (10) Thorax, including pleura, mostly black; basal wing fascia not extending into base of anal cell ..... **S. lanei** Papavero

10 (9) Thorax yellow in considerable part; basal fascia complete or not.

11 (12) Basal fascia complete; pair of sublateral black spots on tergum 3 separated from each other by more than width of one of them; metanotum yellow; pleural black spot absent or confined to sternopleuron ..... **S. aestiva** (Fabricius)

12 (11) Basal fascia not extending into base of anal cell; sublateral black spots of tergum 3 not separated by more than the width of one of them; metanotum piceous, at least laterally; pleural spot extensive, covering most of sternopleuron and extending into pteropleuron and mesopleuron ..... **S. schildi**, n. sp.

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A REVIEW OF THE GENUS TURACOECA WITH DESCRIPTION OF A NEW SPECIES
(MALLOPHAGA: MENOPONIDAE)[1]

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The genus *Turacoeca* Thompson, 1938, includes three species of lice (Hopkins and Clay, 1952), these restricted in their known distribution to the plantain eaters (Cuculiformes: Musophagidae). Thompson (1938) placed two of these three species within *Turacoeca* and discussed them. It is my purpose here to expand upon these descriptions, to characterize the third species, and to describe a new species.
I thank Dr. Theresa Clay, British Museum (Natural History), and Dr. K. C. Emerson, Arlington, Virginia, for their assistance in this study.

Turacoeca scleroderma (Ewing)
(Figs. 1, 5, 6)

Colpocephalum scleroderma Ewing, 1930, Proc. Biol. Soc. Wash. 43:127. Type-host: "Plaintan eater"—*Musophaga rossae* Gould, but probably *Corythaeola cristata* (Vieillot).

Female. As in fig. 5. Head with 1 pair of minute middorsal setae, both pairs of occipital setae minute, 2 very long marginal temple setae on each side, and subocular comb row with 2–3 longer setae immediately preceding it. Pronotum marginally with 8 long, 8–9 short setae; prosternal plate weakly developed, without longer setae. Metanotum marginally with 10–12 setae, medioanteriorly without setae, but with up to 2 or so microalveoli; mesosternal plate with 2 setae, metasternal plate, 4–5. Each femur III ventrally with 3–4 comb rows of short spiniform setae. Abdominal tergite I much longer than any of II–VIII; tergites II–VI pale medially, but not clearly divided. Total marginal abdominal tergal setae, including very long postspiracular setae on each segment: I, 14–15; II, 23–26; III–V, 28–35; VI, 27–31; VII, 23–28; VIII, 18–20; without anterior setae. Last tergite with 2 very long setae on each side, preceded by a stouter shorter seta, and with 11–14 minute to medium inner posterior setae. Abdominal pleura essentially with only marginal setae. Abdominal sternite II longer than others; sternites III–V each with single comb row on each side; sternites VII–IX fused (vulva). Sternal setae: I, 7–9; II–III, 6–8; IV–V, 7–11; VI, 15–19; VII, 20–21. Vulval margin flatly rounded, with 24–30 setae; with 26–35 setae anteriorly on VIII–IX. Anus close to that of fig. 3, with ventral fringe of 15–17 setae, including 2 stout longer setae at each corner, and dorsal fringe of 24–26 setae; without inner setae. Without evident internal structure of genital chamber.

Male. As in fig. 1. Head and thorax essentially as for those of ♀. Abdominal tergite I longer than II–VIII; tergites evenly pigmented, without evidence of division. Marginal tergal setae, including very long postspiracular setae on each segment: I, 14; II, 18–19; III, 22–30; IV–VI, 24–28; VII, 20–22; VIII, 15–18;

[1] Paper No. 6473, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul, Minnesota 55101.

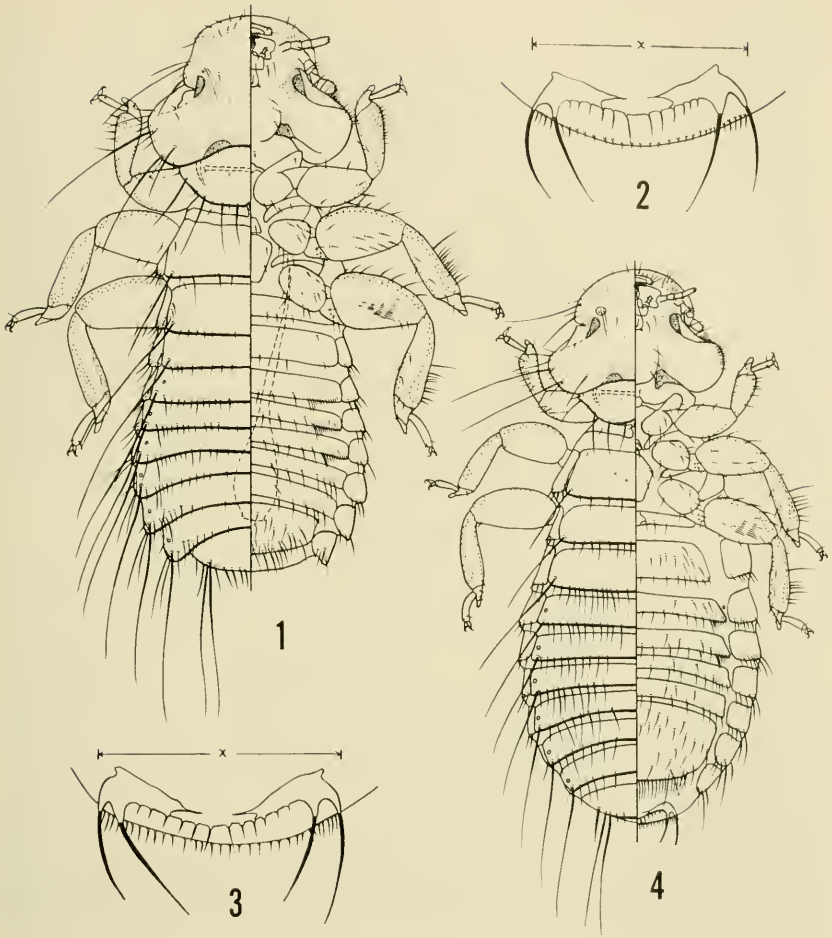


Fig. 1, *Turacoeca scleroderma* (Ewing), male. Fig. 2, *T. subrotunda* (Giebel), female anus. Figs. 3–4, *T. bedfordi* Thompson: 3, female anus; 4, female.

without anterior setae. Chaetotaxy of last tergite as for ♀, except for longer inner posterior setae. Abdominal sternites I–VII close to those of ♀. Sternites VIII–IX fused (genital plate), VIII with 17–19 setae, IX with 9–10 marginal, 7–13 anterior setae. Genitalia as in fig. 6, with slender tapered basal apodeme, with genital sclerite having lateroposterior projections and slightly shorter medioposterior process, with unbarbed penis, with endomeral plate constricted apically, and without apparent parameres.

Dimensions (in mm): preocular width, ♀ 0.42–0.45, ♂ 0.39–0.40; temple width, ♀ 0.65–0.66, ♂ 0.61–0.62; head length, ♀ 0.39–0.41, ♂ 0.39–0.40; prothorax width, ♀ 0.45–0.46, ♂ 0.41–0.43; metathorax width, ♀ 0.71–0.76, ♂ 0.55–0.60;

total length, ♀ 1.88–1.99, ♂ 1.62–1.70; ♂ genitalia, length 0.75–0.80, width 0.12–0.13.

Material Examined: 1 ♂ (holotype of *C. scleroderma* Ewing), "Plaintan eater," Belgian Congo; 5 ♀♀, 10 ♂♂, *Corythaeola cristata,* Uganda (3 collections).

The true type-host of *T. scleroderma* has been questioned (Thompson, 1938; Hopkins, 1942). The slide with the holotype shows the host only as "Off Plaintan eater," this being in ink in the same writing as the rest of the collection data; in light pencil at a corner is written "*Musophaga.*" Ewing (1930) gave the type-host as *Musophaga rossae,* without explaining the basis for this identification and without entering this on the slide label. Subsequent collections have shown this holotype ♂ to be conspecific with lice from *C. cristata,* another plantain eater common in the Ituri Forest where the host of Ewing's specimen was taken (Hopkins, 1942). Other specimens from *Musophaga* have proven to be another *Turacoeca* species quite different from *T. scleroderma.* It would seem most probable that *M. rossae* is an incorrect identification or incorrect statement of the host.

Turacoeca bedfordi Thompson
(Figs. 3, 4, 7)

Turacoeca bedfordi Thompson, 1938, Ann. Mag. Nat. Hist. (Ser. 11) 2:353.
Type-host: *Gymnoschizorhis leopoldi centralis* Neumann.

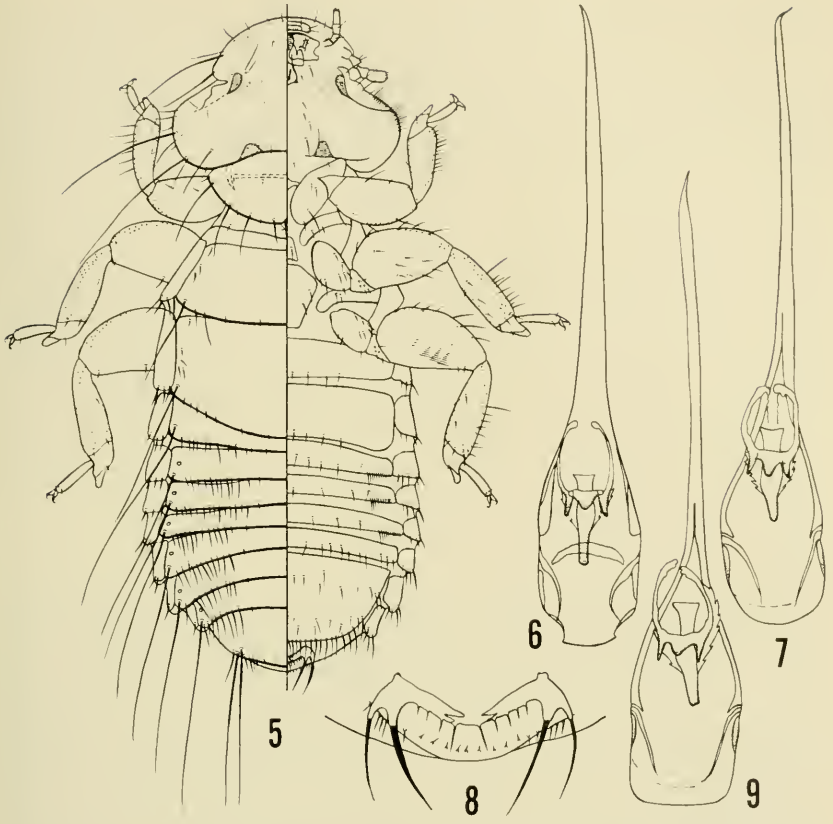
Female. As in fig. 4. Differs from *T. scleroderma* as follows. Prosternal plate more developed, but still without longer setae. Mesosternal plate with 3 setae. Each femur III ventrally with only 2, less often 3, comb rows. Abdominal tergites I–II somewhat longer than III–VIII, but I not pronouncedly longer as with *T. scleroderma*; tergites uniformly pigmented. Marginal tergal setae, including very long postspiracular setae on each segment: I, 18–19; II, 28–30; III–IV, 22–25; V, 18–22; VI, 17–18; VII, 15–16; VIII, 14. Last tergite with only 4 short inner posterior setae. Only sternites III–IV with single comb row on each side. More sternal setae: I, 6; II, 36–40; III–VII, 17–27. Anus as in fig. 3, with 15–16 setae in ventral fringe, 32–37 in dorsal fringe; those in dorsal fringe comparatively long, with bases at posterior margin; width of anus (fig. 3: x), 0.27 mm. Smaller dimensions.

Male. Essentially as for ♀ of *T. bedfordi,* except for ventral terminalia, genitalia, and even smaller size, thereby differing from ♂ of *T. scleroderma* in many of same ways as above. Mesosternal plate with only 1 seta. Genital plate much as for that of *T. scleroderma* (fig. 1). Genitalia as in fig. 7, with evenly rounded endomeral plate.

Dimensions (in mm): preocular width, ♀ 0.38–0.39, ♂ 0.36; temple width, ♀ 0.55–0.57, ♂ 0.52; head length, ♀ 0.34, ♂ 0.35; prothorax width, ♀ 0.37, ♂ 0.33; metathorax width, ♀ 0.55–0.59, ♂ 0.46; total length, ♀ 1.76–1.78, ♂ 1.46; ♂ genitalia, length 0.61, width 0.10.

Material Examined: 2 ♀♀, 1 ♂ (paratypes of *T. bedfordi* Thompson), *Gymnoschizorhis leopoldi centralis,* Uganda.

This species is readily separable from *T. scleroderma* by a number of features, including absence of comb row on sternite V, more



Figs. 5–6, *Turacoeca scleroderma* (Ewing): 5, female; 6, male genitalia. Fig. 7, *T. bedfordi* Thompson, male genitalia. Figs. 8–9, *T. leucotis*, n. sp.: 8, female anus; 9, male genitalia.

reduced abdominal tergite I of ♀, more sternal setae for both ♀ and ♂, and different shape of endomeral plate of ♂ genitalia. Thompson (1938), in stating "I have been unable to find any differences in the male genitalia," apparently placed no significance on the shape of the endomeral plate. However, I have found this to be a good feature for separation.

Turacoeca subrotunda (Giebel)
(Fig. 2)

Colpocephalum subrotundum Giebel, 1874, Insecta Epizoa, p. 266. Type-host: *Musophaga violacea* Isert.

Female. Specimens from type-host as follows, with values in parentheses representing those of other material when different. Very close to *T. bedfordi* (fig. 4).

Mesosternal plate with 2 longer setae. Fewer marginal abdominal tergal setae: I, 17 (12–13); II, 24 (21); III, 20 (15–19); IV, 20 (16–20); V, 17 (15–17); VI, 16 (14); VII, 12–14; VIII, 10 (10–11). Shorter postspiracular setae on tergite IV, occasionally on V. Sternal setae: I, 8; II, 35 (32–33); III–IV, 19 (16–23); V, 24 (24–27); VI, 22 (22–25); VII, 23 (20–21). Anus as in fig. 2, with dorsal fringe of 33–37 (28–32) setae, medially shorter and with bases submarginal; narrower anus (fig. 2: x), 0.23 mm. Consistently smaller size.

Male. No available material from type-host, but specimen from *Tauraco livingstonii schalowi* (Reichenow) tentatively considered to represent *T. subrotunda*, with characters as follows. Very close to *T. bedfordi*. Fewer marginal abdominal tergal setae, as for ♀; postspiracular setae broken off. Fewer sternal setae on: III–IV, 15; V, 17; VI, 19; VII, 15; VIII, 16. Genitalia apparently as for *T. bedfordi* (fig. 7). Consistently smaller size.

Dimensions (in mm): preocular width, ♀ 0.32–0.34, ♂ 0.32; temple width, ♀ 0.47–0.48, ♂ 0.42; head length, ♀ 0.31–0.32, ♂ 0.32; prothorax width, ♀ 0.32, ♂ 0.29; metathorax width, ♀ 0.45–0.46, ♂ 0.36; total length, ♀ 1.42–1.51, ♂ 1.08 (telescoped); ♂ genitalia, length 0.56, width 0.10.

Material Examined: 2 ♀♀ (including 1 paratype of *T. bedfordi* Thompson), *Musophaga v. rossae* Gould, Uganda (2 collections); 1 ♀ (paratype of *T. bedfordi*), *Ruwenzorornis j. johnstoni* (Sharpe), Uganda; 2 ♀♀, 1 ♂, *Tauraco livingstonii schalowi*, Tanganyika (1 collection).

Thompson (1938), while listing *Colpocephalum subrotundum* among the musophagid lice, gave no further description of it. Hopkins (1942) stated that *C. subrotundum* almost certainly belongs to *Turacoeca*, but he raised the possibility that *M. violacea* might not be the correct host. On the basis of specimens I have examined, I see no reason for not considering *T. subrotundum* a species distinct from *T. bedfordi* and *M. violacea* as the correct type-host. Thompson had included material from *M. violacea* and *R. johnstoni* within his paratype series of *T. bedfordi*; however, I find that the reduced number of marginal abdominal tergal setae, the smaller size, the shorter postspiracular setae on IV at least for the ♀, the features of the ♀ anus, and fewer abdominal sternal setae of the ♂ adequate justification for separation from the closely related *T. bedfordi*.

Turacoeca leucotis, n. sp.
(Figs. 8, 9)

Type-host: *Tauraco leucotis* (Rüppell).

Female. Very close to that of *T. subrotunda* in general features of size and chaetotaxy. Only 24 setae on abdominal sternite II. Anus (fig. 8) with only 22 setae in dorsal fringe, short and placed as for *T. subrotunda*, but with only 12 mediad to very long corner ventral fringe setae, instead of 19–24 in this position as for *T. subrotunda*.

Male. Likewise very close to ♂ from *Tauraco livingstonii* presumed to represent *T. subrotunda*. Differences observed only in the genitalia (fig. 9), with genital sclerite having lateroposterior projections distinctly longer than mediposterior process and with distal margin of endomeral plate flattened.

Holotype: ♀, *Tauraco leucotis*, Shashamane, Ethiopia, 16.xi.1958, O. Theodor; at British Museum (Natural History).

Paratype: 1 ♂, same data as holotype.

This species is admittedly very close to *T. subrotunda*, but the features of the ♀ anus and ♂ genitalia are believed sufficiently different to justify a species status more than contributing to a broadening of the *T. subrotunda* characterization.

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———— *and* **T. Clay.** 1952. A check list of the genera & species of Mallophaga. London: Brit. Mus. (Nat. Hist.), 362 p.

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SELECTION OF LECTOTYPES FOR SOME SPECIES OF EUXOA HÜBNER DESCRIBED BY J. B. SMITH

(Lepidoptera: Noctuidae)

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For several years I have been engaged in a study of the type material of noctuid species described by J. B. Smith. He proposed nearly 1,000 names for species in the family. Descriptions of about one-fourth of the species were based on uniques; the remainder require lectotype designations. The study is nearly completed, but preparation of the manuscript still will require considerable time because of the large number of species involved. The present lectotype designations are provided in order that D. F. Hardwick, Entomology Research Institute, Ottawa, Canada, can publish a paper on that section of the genus *Euxoa* Hübner to which the species treated belong. The selection of the lectotype for each name treated herein has been discussed with Hardwick, and he concurs with my selections.

For each name the following information is presented: 1, original combination; 2, reference to original description; 3, pertinent comments from the original description bearing on the number, sex,

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locality and collection, and source of the syntypes; and 4, subsequent pertinent references, comments, and actions. The number of syntypes examined in this study, present location, label data, and condition are also presented.

Smith was inconsistent in labeling specimens of the type series, but in general, prior to 1899, he usually labeled all specimens as "Type." After 1899 he usually labeled a "♂ type" and/or "♀ type" (depending on whether both sexes were recognized as being present). Other specimens (when present) were labeled as "♂ cotype," "♀ cotype" or simply "cotype" (present sense of paratype). For those species described after 1899 in which some specimens were labeled as types and others as cotypes, I have endeavored, all things being equal, to select as lectotypes specimens labeled either "♂ type" or "♀ type." For the species of *Euxoa* I have selected the "♀ type" when a choice was possible.

In the cases of three names, *Setagrotis dolens* Sm., *Setagrotis elata* Sm., and *Euxoa quinta* Sm., each represented by syntypes of both sexes, selection of males as lectotypes seems desirable in consideration of actions taken by McDunnough (1950, pp. 369–370). For each of the three names he referred to a male syntype as the "holotype" and indicated a specific locality and collection. These actions by McDunnough have been discussed with C. W. Sabrosky,[2] a Commissioner, International Commission on Zoological Nomenclature. He is of the opinion that McDunnough's actions constitute lectotype designations. I confess that I do not fully follow the reasons for his opinion and that I am still in doubt as to whether McDunnough's actions constitute lectotype designations according to Article 74(a) and the definitions of the terms holotype, lectotype, and type-specimen in the Glossary of the 1961 International Code of Zoological Nomenclature. Possibly I have not properly interpreted the usage of certain quotation marks therein. Hardwick was also of the opinion that McDunnough had not designated lectotypes. In consideration of possible differences of opinion as to whether McDunnough did or did not designate lectotypes in the instances in question, it seems desirable to select and designate as lectotype the same specimens listed as "holotypes" by McDunnough. This will assure that the type-specimen is the same regardless of who is considered to have designated the lectotype.

In the course of his career Smith described 87 species in which he included a statement about type and USNM type number in the description. An example is that of *Carneades factoris* Smith, 1900, p. 456: "*Type.*—Cat. No. 4795 U.S.N.M." This species and three other species with similar statements are treated in this paper. Before the

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significance of the reference to type and type number is discussed, a review of type recording at the U.S. National Museum and a discussion of Smith's type concepts, descriptive procedures, and use of type numbers seems desirable.

The practice of recording types and assigning type numbers for insect types at the U.S. National Museum began on March 10, 1896. The first 15 species and most of the first 500 species recorded were moths described by Smith. Smith was very inconsistent in use of type numbers in descriptions. The bulk of his type number citations appeared in various numbers of the *Proceedings of the U.S. National Museum* beginning with volume 21, 1899, but he also used type numbers in papers in the *Canadian Entomologist* and the *Proceedings of the Washington Academy of Sciences.* In other papers published after 1898 Smith did not use type numbers in the descriptions even though many of the "types" were deposited in the U.S. National Museum. Even in a single paper Smith did not consistently use type numbers. For example, in Proc. U.S. Nat. Mus., 1900, he described 100 new species and stated (p. 413): "With few exceptions, the types of the species are now or will be deposited in the U.S. National Museum." In that paper type numbers may be found in the descriptions of 57 species. These were undoubtedly the numbers assigned to the "types" that already were in the museum. A considerable number of the "types" of the other described species were eventually deposited in the museum and received type numbers, but those numbers were not recorded in the original descriptions.

Smith never had a holotype concept. For the species he described between 1882 and 1898 he labeled all the specimens "Type," except in some papers in 1895 he used "Type 1," "Type 2," *etc.* and also "Type" and "Duplicate Type." In 1893, p. 11, he explained his type concept at that time: "Mr. Grote's practice seems to have been to mark all specimens before him when writing his original description, as 'type,' and I think Mr. Grote is right. It is the sum of the characters of the specimens before the describer that makes the species, and though neither may be the type of *all* the characters, yet all are types of the species." His procedure changed after 1899 as I have previously noted.

Of the 87 Smith descriptions containing a reference to USNM type number, 34 were based on one sex only and only one specimen is labeled "type." Some of these are uniques and therefore are holotypes. Of the remainder only one specimen is labeled type, and usually it is the only specimen to bear the USNM type number label. In a few instances "cotypes" also bear the type number. Of the 53 descriptions based on both sexes (♂type and ♀type with or without cotypes) both "types" may be in the U.S. National Museum with both or only one bearing the type number, or only one "type" may be in that

collection and bear the type number label, or both "types" may be in other collections and the type number label found only on "cotypes." In seven instances the type number cited in the descriptions has not been located on any specimen.

Masner and Muesebeck (1968, p. 2) stated: "Where an author, in connection with his original description of a species, mentioned a National Museum type number and only one specimen bearing this number is marked 'Type' he is considered to have designated a holotype, even though he did not expressly say so in his description." I am inclined to agree with this opinion; however, others do not agree that inclusion of the word "*Type*" and a USNM type number satisfies the requirements of Article 73(b) of the 1961 International Code of Zoological Nomenclature. In the case of the species described by Smith, considering his type concept, one probably should question whether his use of "*Type*" preceding the type number was intended to refer to *the* type or to *a* type. Accordingly, it seems to me that the only reasonable action in these cases is to select and designate as lectotype for each species the specimen labeled "type" and bearing the type number.

In this paper the abbreviations, USNM, AMNH, and CNC are used frequently for the U.S. National Museum, the American Museum of Natural History, and the Canadian National Collection, respectively.

Agrotis aurulenta Smith, 1890, U.S.N.M. Bull. 38:215,

"HABITAT.—Colorado, Nebraska, Arizona." "Four specimens, three males and one female, all from the collection U.S. National Museum, are before me. Three of these are from Mr. Bruce, collected, one ♂ 'foothills near Denver,' and this is the smallest and almost immaculate specimen, the venular marks of t. p. line only being distinctly traceable; one ♀, 'Platte Canon, 6,500 feet,' and this is the largest, the transverse maculation obsolete, the dusky markings of the veins most distinct; the third specimen is also a ♂, 'Omaha, Nebr., June,' and this has a distinct reddish shade to the t. p. line, all the maculation very well defined. The fourth specimen without marked locality, is a ♂, which was given to me years ago by Mr. George Frank, who had several others in his collection, I think, from Arizona."

Smith, 1893, U.S.N.M. Bull. 44:66. "The types are in the National Museum collection."

Syntypes examined: 4 (All USNM)

1) "Agrotis aurulenta Smith Type"; "49"; "foothills near Denver, Colo., Bruce"; "Type No. 81 USNM"; "Lectotype"; "♂ genitalia on slide 2204 E. L. Todd"
2) "Agrotis aurulenta Smith Type"; "Collection J. B. Smith"; "Type No. 81 USNM"; [A ♂, abdomen missing.]
3) "Agrotis aurulenta Smith Type"; "51"; "Platte Canon, Colo., 6500 ft., D. Bruce"; "Type No. 81 USNM"; "♀ genitalia on slide USNM 1243 J. G. Franclemont"
4) "Agrotis aurulenta Smith Type"; "Setagrotis aurulenta Smith Type";

"Omaha, Neb., June 25, 87"; "Type No 81 USNM"; "Agrotis aurulenta ab. aurulentoides"; "Hmpsn., IV-373 and Smith Agrotids, p. 215, FHB, 1933"; "Type No. 50004 USNM" [A ♂, abdomen missing.]

Discussion:—McDunnough (1950, p. 371) stated: "It would seem well to designate as lectotype a male specimen, very pale, taken in the "Foothills near Denver, Colo. Bruce." and "Types: *Aurulenta*, holotype, male, Denver, Colorado (U.S.N.M.);" This is the only case of use of lectotype by McDunnough in that paper and the wording, "It would seem well to designate. .", leaves a question as to whether he did, in fact, designate a lectotype. Accordingly, I have selected, labeled, and now designate the specimen from "foothills near Denver, Colo., Bruce" as the lectotype.

Agrotis atomaris Smith, 1890, Trans. Amer. Ent. Soc. 17:47.

"*Habitat.*—California (Neumoegen)." "Three males are before me, all very much alike."

Smith, 1890, U.S.N.M. Bull. 38:154. "HABITAT.—California (Neumoegen. Collection U.S. National Museum)." "A large series in the Museum collection is all referable to this species." Smith, 1893, USNM Bull. 44:92. "Types are in the National Museum and in the Neumoegen collection."

Syntypes examined: 3 (All USNM)

1) "Agrotis atomaris Smith Type"; "Cal."; "Col. B. Neumögen"; "Type No. 33755 USNM"; "♂ genitalia on slide 2286 E. L. Todd"
2) "Agrotis atomaris Smith Type"; "Col. B. Neumögen"; "♀ genitalia on slide 2288 E. L. Todd" [A ♀ contrary to original description.]
3) "Agrotis atomaris Smith Type"; "Cal."; "Type No. 111 USNM"; "36511" [A ♂, abdomen broken from specimen, a ♂ abdomen attached to pin below specimen.]

Discussion:—The three syntypes listed above are undoubtedly the specimens which were before Smith when he described the species, in spite of the fact that one specimen is a female. Smith was commonly in error as to the sex of specimens. There is a fourth specimen in the collection of the U.S. National Museum from Alameda Co., California received from the U. S. Department of Agriculture through C. V. Riley, that was entered in the type book under type number 111 on June 18, 1896. It is not a syntype. The third syntype mentioned above also bears the USNM type number 111. That specimen was received from John B. Smith on May 19, 1900. It is the specimen of the original series that Smith retained, and undoubtedly it is the specimen referred to by Smith (1893, p. 92) as being in the National Museum. It obviously was not in this collection at that time. Because of the incorrectly determined sex and lack of locality label of one syntype and the broken condition of another, I have selected, labeled, and presently designate the male syntype bearing the USNM type number 33755 as the lectotype.

Chorizagrotis boretha Smith, 1908, Jour. N. Y. Ent. Soc. 16:86.

"*Habitat.*—Kaslo, B. C., August and September, Mr. Cockle." "Three males and one female, none of them very good, . . ."

Syntypes examined: 4 (1 AMNH, 2 CNC, and 1 USNM)

1) Chorizagrotis boretha Smith ♀type"; "Kaslo, B. C."; "6.IX.02"; "Barnes Collection"; "♀ genitalia on slide 2321 E. L. Todd" [USNM]
2) "Chorizagrotis boretha Smith ♂type"; "Kaslo, B. C."; "6.IX.02"; "J. B. Smith Collection Rutgers" [AMNH]
3) "Rhizagrotis boretha Sm. cotype"; "25.VII 03"; "25.VIII.1903, Kaslo, B. C., Coll. J. W. Cockle"; "PARATYPE, R. boretha Sm. No. 883"; "SLIDE Euxoa ♂ No. ER3346" [Genitalic preparation by E. Rockburne] [CNC]
4) "Rhizagrotis boretha Sm. cotype"; "11.IX 06"; "11.IX.1906, Kaslo, B. C., Coll. J. W. Cockle"; "PARATYPE, R. boretha Sm., No. 883"; "SLIDE Euxoa ♂ No. ER3468" [Genitalic preparation by E. Rockburne] [CNC]

Discussion:—Following the procedure of selecting females as lectotypes where possible, I have selected, labeled and presently designate the syntype labeled "♀type" in the U.S. National Museum as the lectotype.

Euxoa criddlei Smith, 1908, Ann. N. Y. Acad. Sci. 18(2):97.

"*Habitat*: Aweme, Manitoba, Aug. 24, 25, Sept. 4." "One male and two females, in good condition; from Dr. James Fletcher, collected by Mr. Criddle, after whom the species is named."

Syntypes examined: 2 (Both AMNH)

1) "Euxoa criddlei Smith ♀type"; "Aweme, Man, 25.VIII.06, Criddle"; "17"; "J. B. Smith Collection Rutgers"; "slide Euxoa No. 5023♀" [Genitalia slide prepared by D. F. Hardwick.]
2) "Euxoa criddlei Smith ♂type"; "Aweme, Man., 4.IX.04, Criddle"; "J. B. Smith Collection Rutgers"

Discussion:—The syntype labeled "♀type" in the collection of the American Museum of Natural History, New York, N. Y. has been selected, labeled, and is presently designated as the lectotype. I have been unable to locate the other female syntype.

Carneades detesta Smith, 1893, U.S.N.M. Bull. 44:93.

"HABITAT.—Colorado." "I have mistaken Dr. Harvey's species, as appears by the type in the British Museum, and I propose the name *detesta* for the species I have described in my revision under the term *choris*." [See Smith, 1890a, p. 158, pl. 5, fig. 68, in part.]

Syntypes examined: None.

Discussion:—Smith apparently did not label any specimens as types of this name, and I have been unable to identify any specimens from Colorado that he originally misidentified as *Carneades choris* (Harvey). There are four specimens in the collection of the U.S. National

Museum that were identified as *Carneades detesta* Smith by Smith, but they are from Arizona and Utah. Barnes and McDunnough (1912, p. 37, pl. 17, figs. 4 and 11) figured a male and a female from Eureka, Utah as this species and made the following statement: "It is a name proposed for the species wrongly identified by Smith in his Revision as *choris* Harv. and is without a type. We have a specimen from Arizona labelled *detesta* by Smith which agrees well with the specimen figured, with the exception of the central shading being more ochreous in the Arizona specimen." The Arizona specimen to which they referred is now in the U.S. National Museum. Hardwick will consider the name and its placement in his paper on *Euxoa*.

Setagrotis dolens Smith, 1906, Can. Ent. 38(7):226.

"*Habitat.*—Arrowhead Lake, British Columbia, June 8–15; Beulah, Manitoba, Aug. 28." "One male and two females in good condition in Dr. Barnes's and my own collection."

Syntypes examined: 3 (2 AMNH and 1 USNM)

1) "Setagrotis dolens Smith ♂ type"; "Beulah, Manitoba"; "28/8/02"; "Collection J. B. Smith" [AMNH]
2) "Setagrotis dolens Smith ♀ type"; "Arrowhead Lake, B.C."; "J. B. Smith Collection Rutgers"; "slide Euxoa No. 5028♀" [Genitalia slide prepared by D. F. Hardwick.] [AMNH]
3) "Setagrotis dolens Smith ♀ cotype"; "Arrowhead Lake, B.C."; "June 8–15"; "♀ genitalia slide USNM 1262 J. G. Franclemont" [USNM]

Discussion:—McDunnough (1950, p. 370) referred to two of the syntypes of this species as follows: "Types: . . . ; *dolens*, holotype, male, Beulah, Manitoba (location unknown; not at Rutgers University, New Brunswick, New Jersey); paratype female, Arrowhead Lake, British Columbia (USNM); . . ." Some entomologists would consider his action to constitute lectotype designation; others would disagree with that opinion. McDunnough did not label the specimen lectotype or holotype. In fact, in this instance he did not even see the specimen, yet he placed the name in the synonymy of *Euxoa quebecensis* (Smith). He apparently did not see the specimen labeled "♀ type" at Rutgers either, as he does not mention the specimen. Rindge (1955, p. 108) lists both specimens. However, the male does not bear a "J. B. Smith Collection Rutgers" label. It is possible that McDunnough based his identification of the species on the "♀ cotype" in the U.S. National Museum. In order to be consistent with McDunnough's restriction I have selected, labeled, and presently designate the "♂ type" from Beulah, Manitoba as the lectotype.

Carneades edictalis Smith, 1893, Ent. News 4(3):99, pl. 6, fig. 3.

"*Hab.*—Colorado. Bruce. Nos. 70, 207, 326." "Three males are at hand, the antennae pectinated."

Smith, 1894, Trans. Amer. Ent. Soc. 21:46, pl. 2, fig. 3, again describes this as new, using the same plate. He adds: "Mr. Bruce has sent me three specimens, all of them males, and all much alike. One of them is labeled 'Salida, 4, 18, 88,' the others are more recent captures."

Syntypes examined: 3 (2 USNM and 1 AMNH)

1) "Carneades edictalis Smith Type ♂"; "Colo., Bruce"; "70"; "Type No. 134 USNM"; "♂ genitalia on slide 1802 E. L. Todd" [Both hind wings torn.] [USNM]
2) "Carneades edictalis Smith Type ♂"; "Colo., Bruce"; "326"; "Type No. 134 USNM"; "♂ genitalia on slide 2156 E. L. Todd" [USNM]
3) "Carneades edictalis Smith Type ♂"; "Salida, 4-18-88"; "Colo., Bruce"; "207"; "J. B. Smith Collection Rutgers"; "slide No. Euxoa 5001 ♂" [Genitalia slide prepared by D. F. Hardwick] [Abdomen and thorax badly damaged by dermestids.] [AMNH]

Discussion:—The syntype in the U.S. National Museum bearing the Bruce number "70" is the specimen that was illustrated by Smith. It has been selected and labeled as lectotype, and it is now so designated.

Setagrotis elata Smith, 1898, Jour. N. Y. Ent. Soc. 6:106.

"*Habitat*: Colorado." "I have three specimens, two males and one female, received from Professor C. P. Gillette, and numbered 565, 2610 and 2732."

Syntypes examined: 3 (2 USNM and 1 AMNH)

1) "Setagrotis elata Smith ♂ type"; "Colo., 2632"; "74"; "Type No. 4153 USNM"; "USNM Acc. No. 34638"; "♂ genitalia on slide 2223 E. L. Todd" [USNM]
2) "Setagrotis elata Smith ♀ type"; "Colo., 2610"; "90"; "Type No. 4153 USNM"; "36511" [An accession number]; "♀ genitalia on slide 2224 E. L. Todd" [USNM]
3) "Setagrotis elata Smith ♂ cotype"; "Colo., 565"; "J. B. Smith Collection Rutgers" [AMNH]

Discussion:—Smith apparently incorrectly cited the number 2632 on the "♂ type" as 2732. Hampson (1903, p. 530 and pl. LXXIV, fig. 10) treats the species. He stated: "This species is unknown to me; figured from a photograph from type in U.S. Nat. Mus." On the explanation of plate LXXIV, figure 10 he stated that the specimen figured was a ♂ from Colorado. McDunnough (1950, p. 369) stated: "Types: . . . ; *elata*, holotype, male, allotype, female, Colorado (C. P. Gillette), presumably Fort Collins (U.S.N.M.) . . ." In line with these restrictions, I have selected, labeled, and presently designate the "♂ type" in the U.S. National Museum as the lectotype.

Euxoa esta Smith, 1906, Can. Ent. 38(7):227.

"*Habitat.*—Wellington, British Columbia, July 30, Aug. 14 and Sept. 13. Theodore Bryant." "One male and three females, all in good condition, two of them from Dr. Barnes's collection, two from my own."

Syntypes examined: 4 (2 AMNH and 2 USNM)

1) "Euxoa esta Smith ♂ type"; "Wellington, B. C."; "14-8-03"; "J. B. Smith Collection Rutgers" [AMNH]
2) "Euxoa esta Smith ♀ type"; "Wellington, B. C., 13.IX.02"; "Collection J. B. Smith"; "slide Euxoa No. 5031 ♀" [Genitalia preparation by D. F. Hardwick] [AMNH]
3) "Euxoa esta Smith ♀ cotype"; "Wellington, B.C., Theo. Bryant"; "14-8-03" [USNM]
4) "Euxoa esta Smith ♀ cotype"; "Wellington, B.C., 30-VII-02"; "Doesn't agree with *esta* ♂ Type" [USNM]

Discussion:—My policy of selecting females when possible as lectotypes in this genus is followed here. Accordingly, I have selected, labeled, and presently designate the "♀ type" in the American Museum of Natural History as the lectotype.

Carneades factoris Smith, 1900, Proc. USNM 22(1203):456.

"*Habitat.*—Glenwood Springs, Colorado, June, July and August (Dr. Barnes)." "Five females in fair condition only." "*Type.*—Cat. No. 4795, U.S.N.M."

Syntypes examined: 5 (3 USNM and 2 AMNH)

1) "Carneades factoris Smith ♀ type"; "Glenwood Springs, Col., 1894-7/19"; "Type No. 4795 USNM"; "36311"; "♀ genitalia on slide 2299 E. L. Todd" [USNM]
2) "Carneades factoris Smith cotype"; "Glenwood Spgs., Colo"; "June 8–15" [A ♀] [USNM]
3) "Carneades factoris Smith cotype"; "Glenwood Spgs., Colo"; "July 1–7" [A ♀] [USNM]
4) "Carneades factoris Smith cotype"; "Glenwood Springs, Col., 1894-7/10, W. Barnes"; [A ♀] [AMNH]
5) "Carneades factoris Smith cotype"; "Glenwood Springs, Col., 1892- 8, W. Barnes" [A ♀] [AMNH]

Discussion:—I have selected, labeled, and now designate the specimen marked "♀ type" in the U.S. National Museum as the lectotype. Some workers may consider that inclusion of the word type and type number in the original description constitutes holotype designation by Smith. In either event, the type-specimen is the same.

Carneades fulda Smith, 1900, Proc. U.S.N.M. 22(1203):437.

"*Habitat.*—Alameda County, California, September." "Two female specimens from the U.S. National Museum, collected by Mr. A. Koebele." "*Type.*—Cat. No. 4792, U.S.N.M."

Syntypes examined: 2 (1 USNM and 1 AMNH)

1) "Carneades fulda Smith ♀ type"; "Alameda Co., Cal."; "Sept."; "Through C. V. Riley"; "Type No. 4792 USNM"; "♀ genitalia on slide 2249 E. L. Todd" [USNM]
2) "Carneades fulda Smith cotype"; "Alameda Co., Cal."; "Sept." [AMNH]

Discussion:—I have selected, labeled, and now designate the "♀ type" in the U.S. National Museum as lectotype. My reasons for designation of a lectotype are explained in the introductory comments in this paper.

Agrotiphila incognita Smith, 1893, Ent. News 4(3):101, pl. 6, fig. 9.

"*Hab.*—Laggan, British Col., above timber. Bean, Nos. 462, 492." Smith, 1894, Trans. Amer. Ent. Soc. 21:52, pl. 2, fig. 9 again described this as new, using the same plate. He changed the habitat statement as follows: "*Hab.*—Laggan, British Columbia, above timber, 7000 feet, July 22, 1890; Aug. 10, 1891, Bean, Nos. 462, 492." and adds "Two male specimens are before me. ."

Syntypes examined: 2 (Both USNM)

1) "Agrotiphila incognita Smith ♂ type"; "Laggan, B. C., above timber, 7000 ft., July 24, '89"; "492"; "Type No. 141 USNM"; "♂ gen. 363 17Aug32 FHB" [F. H. Benjamin slide]
2) "Agrotiphila incognita Smith ♂ type"; "Brit. Col."; "462"; "Type No. 141 USNM"; "♂ gen. 364 17Aug32 FHB"

Discussion:—There are several discrepancies between the collection dates published in the second description and those on the specimens. Laggan was a railroad station in Alberta about 2 miles from Lake Louise. I do not know why the locality was given as in British Columbia. Perhaps Bean actually collected the specimens in British Columbia near Laggan. I have selected, labeled, and now designate the specimen with label "492" in the U. S. National Museum as the lectotype.

Carneades luteositus Smith, 1900, Proc. U.S.N.M. 22(1203):433.

"*Habitat.*—Hall Valley, Colorado. July 24 to 30 (Dr. Barnes)." "One male and one female, both in good condition."

Syntypes examined: 2 (Both USNM)

1) "Carneades luteositus Smith ♂ type"; "Hall Valley, Colo."; "Type No. 5138 USNM"; "36511"; "♂ genitalia on slide 2293 E. L. Todd"
2) "Carneades luteositus Smith ♀ type"; "Hall Valley, Colo."; "July 24–30"; "♀ genitalia on slide 2294 E. L. Todd"

Discussion:—Hampson (1903, p. 242 and pl. LXIII, fig. 23) stated: "This species is unknown to me; figured from a photograph from type in U. S. Nat. Mus." On the explanation of plate LXIII, figure 23 he stated that the specimen figured was a male from Colorado. Because the "♂ type" was figured by Hampson, I have selected, labeled, and presently designate it as the lectotype.

Carneades maimes Smith, 1903, Can. Ent. 35(5):131.

"*Habitat.*—Calgary, Alberta, July 27—August 21 (Mr. Dod); Colorado, July 18 (Mr. Kemp); Brandon, Manitoba (Mr. Hanham)." "Five males and seven females in fair or good condition are before me."

Syntypes examined: 11 (8 AMNH and 3 USNM)

1) "Carneades maimes Smith ♀type"; "Calgary, Alta., 16.VIII.01, (Light), F. H. Wolley Dod"; "Head of Pine Creek"; "48d"; "J. B. Smith Collection Rutgers"; "slide Euxoa No. 5013♀" [Genitalia preparation by D. F. Hardwick] [AMNH]
2) "Carneades maimes Smith ♂type"; "Calgary, Alta., 13.VIII.01, F. H. Wolley Dod"; "Head of Pine Creek"; "66"; "J. B. Smith Collection Rutgers" [AMNH]
3) "Carneades maimes Smith cotype"; "Calgary, Alta., 18.VIII.95, F. H. Wolley Dod"; "Head of Pine Creek"; "J. B. Smith Collection Rutgers" [A ♂] [AMNH]
4) "Carneades maimes Smith cotype"; "Calgary, Alta., 16.VIII.01, (Light), F. H. Wolley Dod"; "Head of Pine Creek"; "J. B. Smith Collection Rutgers" [A ♀] [AMNH]
5) "Carneades maimes Smith cotype"; "Edge of Calgary, Alta., 13.VIII.93"; "J. B. Smith Collection Rutgers" [A ♂] [AMNH]
6) "Carneades maimes Smith cotype"; "Calgary, Alta., 15.VIII.93, F. H. Wolley Dod"; "Mouth of Fish Creek"; "J. B. Smith Collection Rutgers" [A ♀] [AMNH]
7) "Carneades maimes Smith cotype"; "Calgary, Alta., 10.VIII-94, F. H. Wolley Dod"; "J. B. Smith Collection Rutgers" [A ♀] [AMNH]
8) "Carneades maimes Smith cotype"; "Brandon, Manitoba" [A ♀] [AMNH]
9) "Carneades maimes Smith cotype"; "Calgary, 27.VII-94, F. H. W. Dod"; "66a"; "Barnes Collection" [A ♂] [USNM]
10) "Carneades maimes Smith cotype"; "Calgary, Alta, 16.VIII.01, (Light), F. H. Wolley Dod"; "Head of Pine Creek"; "Barnes Collection" [A ♂] [USNM]
11) "Carneades maimes Smith cotype"; "Colo., 7–18"; "Collection S. T. Kemp"; "Barnes Collection" [A ♀] [USNM]

Other syntypes: 1 (CNC)

1) "Carneades maimes Sm. cotype, ex. Coll. Sm II. 10"; "23.VIII.93, Calgary, Alta., F. H. Wolley Dod"; "Mouth of Fish Creek"; "PARATYPE, C. maimes Sm. No. 874"; "a little smaller & paler of than ♀ ♂ type is a good deal darker, Xd II 10 Dod"; "ex Coll. Wolley-Dod" [A ♀]

Discussion:—Following my policy of selecting a female as the lectotype when possible in the genus *Euxoa*, I have selected, labeled, and presently designate the "♀type" in the American Museum of Natural History as the lectotype of this species.

Euxoa moxa Smith, 1907, Trans. Amer. Ent. Soc. 33:129.

"*Hab.*—Colorado, Glenwood Springs; Durango, July 8th to 15th." "One ♂ and one ♀ in good condition."

Syntypes examined: 2 (1 USNM and 1 AMNH)

1) "Euxoa moxa Sm. ♀type"; "Durango, Colo."; "July 8–15"; "Coll. J. B. Smith"; "E. moxa Sm., Comp. with Type ♂, Coll. Smith, See Note No. 125, OK"; "♀ Genitalia Slide: USNM 1265 J. G. Franclemont" [USNM]
2) "Euxoa moxa Smith ♂type"; "Glenwood Spgs., Col."; "Collection J. B. Smith" [AMNH]

Discussion:—McDunnough (1950, p. 370) stated: "Types: . . . ; *moxa*, holotype, female, Durango, Colorado (U.S.N.M.); . . ." To assure that this specimen is considered to be the type-specimen by subsequent workers, I have selected, labeled, and now designate the "♀ type" from Durango, Colorado in the U.S. National Museum as the lectotype.

Euxoa nesilens Smith, 1903, Jour. N. Y. Ent. Soc. 11:192.

"*Habitat*: Brandon, Manitoba; Calgary, Canada, July 5–12 (F. H. Wolley Dod)." "Two males and three females are before me at present; others are in the collection of Mr. Dod, . . ."

Syntypes examined: 4 (All AMNH)

1) "Euxoa nesilens Smith ♀type"; "Calgary, 6.VII.98, F. H. W. Dod"; "Head of Pine Creek"; "J. B. Smith Collection Rutgers"; "slide Euxoa No. 5038♀" [Genitalia preparation by D. F. Hardwick]
2) "Euxoa nesilens Smith ♂type"; "Brandon, Manitoba"; "Collection J. B. Smith"
3) "Euxoa nesilens Smith cotype"; Calgary, Alberta, July 12 (Dod) [A ♂]
4) "Euxoa nesilens Smith cotype"; Calgary, Alberta, July 12 (Dod) [A ♀]

Other syntypes: 1 (CNC)

1) "Carneades nesilens Sm. ♀cotype"; "PARATYPE, E. nesilens Sm. No. 881"; "5.VII.04 (? = 94), Calgary, Alta., F. H. Wolley Dod"; "ex Coll. Wolley-Dod"

Discussion:—It will be noted that the collection data for the two "cotypes" has not been placed in quotation marks. For some unknown reason I neglected to record these data while examining the specimens. I have used the information cited by Rindge (1955, p. 122). Following my policy for *Euxoa* of selecting female lectotypes when possible, I have selected, labeled, and now designate the "♀type" in the collection of the American Museum of Natural History as the lectotype of this species.

Rhizagrotis perolivalis Smith, 1905, Jour. N. Y. Ent. Soc. 13(4):194.

"*Habitat*.—Calgary, Alberta, head of Pine Creek, July 9, 10, 14." One male and three females, all in good condition from Mr. F. H. Wolley Dod."

Syntypes examined: 2 (Both AMNH)

1) "Rhizagrotis perolivalis Smith ♂type"; "Calgary, Alta., 9.VII.96, F. H. Wolley Dod"; "Head of Pine Creek"; "J. B. Smith Collection Rutgers"; "slide Euxoa No. 5014♂" [Genitalia preparation by D. F. Hardwick]
2) "Rhizagrotis perolivalis Smith ♀type"; "Calgary, Alta., 14.VII.94, F. H. Wolley Dod"; "Mouth of Fish Creek"; "J. B. Smith Collection Rutgers" [A ♂! This fact apparently discovered earlier as the ♀ sex sign has been marked-over with pencil.]

Other syntypes: 1 (CNC)

1) "Rhizagrotis perolivalis Sm. ♀ co-type"; "10.VII.04, Calgary, Alta., F. H. Wolley Dod"; "Head of Pine Creek"; "SLIDE Eux No. 25♀" [D. F. Hardwick preparation.] "PARATYPE, R. perolivalis Sm. No. 885"; "ex Coll. Wolley-Dod"

Discussion:—I have been unable to locate one of the "cotypes" which should be a female according to the original description. I have selected, labeled, and presently designate the specimen marked "♂ type" in the collection of the American Museum of Natural History as the lectotype of *Rhizagrotis perolivalis* Smith.

Euxoa pestula Smith, 1904, Can. Ent. 36(6):150.

"Habitat.—Calgary, Alberta, July, August and September, F. H. Wolley Dod." "Twenty examples, representing both sexes in almost equal numbers."

Syntypes examined: 5 (4 AMNH and 1 USNM)

1) "Euxoa pestula Smith ♀type"; "Calgary, Alta., F. H. Wolley Dod"; "4.VII. 04"; "Head of Pine Creek"; "J. B. Smith Collection Rutgers"; "slide Euxoa No. 5032 ♀" [Genitalia preparation by D. F. Hardwick] [AMNH]
2) "Euxoa pestula Smith ♂type"; "Calgary, Alta., F. H. Wolley Dod"; "4.VII. 04"; "Head of Pine Creek"; "J. B. Smith Collection Rutgers" [AMNH]
3) "Euxoa pestula Smith cotype"; "Calgary, Alta., F. H. Wolley Dod"; "1.VII. 04"; "Head of Pine Creek"; "J. B. Smith Collection Rutgers" [A ♂] [AMNH]
4) "Euxoa pestula Smith cotype"; "Calgary, Alta., F. H. Wolley Dod"; "2.VII. 04"; "Head of Pine Creek"; "J. B. Smith Collection Rutgers" [A ♀] [AMNH]
5) "Euxoa pestula Smith cotype"; "Calgary, 27.VI.96, F. H. W. Dod"; "Head of Pine Creek" [A ♀, right hindwing broken.] [USNM]

Discussion:—I have selected, labeled, and now designate the "♀type" in the American Museum of Natural History as the lectotype. Fifteen syntypes have not been located. Smith probably did not put his name label on these specimens and as there are probably more than fifteen specimens with correct locality and date in collections, no effort has been made to identify the specimens. There are 15 in the USNM alone that might be syntypes.

Carneades pindar Smith, 1900, Proc. U.S.N.M. 22(1203):451.

"*Habitat.*—Bluff, Utah (Mrs. H. M. Peabody)." "Two males from the U. S. National Museum, in not the best of condition." "*Type.*—Cat. No. 4789, U.S.N.M."

Syntypes examined: 2 (1 USNM and 1 AMNH)

1) "Carneades pindar Smith ♂type"; "Bluff, Utah, 1898, Mrs. H. M. Peabody"; "Type No. 4789 USNM"; "♂ genitalia on slide 2250 E. L. Todd" [USNM]
2) "Carneades pindar Smith cotype"; "Bluff, Utah, 1898, Mrs. H. M. Peabody" [A ♂] [AMNH]

Discussion:—Hampson (1903, p. 295) states: "This species is unknown to me; figured from a photograph from type in U. S. Nat. Mus." The figure to which he refers is figure 9 on plate LXVI. Smith obviously retained the specimen marked "cotype" for his personal collection. Some may consider that the specimen marked "♂ type" and bearing the USNM type number is the holotype; however, for reasons explained in the introductory part of this paper I believe a lectotype should be designated. Therefore, I have selected, labeled, and presently designate the "♂ type" in the U. S. National Museum as the lectotype.

Agrotis quinquelinea Smith, 1890, Trans. Amer. Ent. Soc. 17:49.

"Habitat.—Sierra Nevada, Cal. (McGlashan)." ". . . so far as they can be made out from the single female before me." Smith, 1890, U.S.N.M. Bull. 38: 175 adds nothing. Smith, 1893, U.S.N.M. Bull. 44:99 states: "The type is in the Edwards collection."

Syntypes examined: 1 (USNM)

1) "Agrotis quinquelinea Smith Type"; "Sier. Nev., Cal."; "Type No. 4980 USNM"; "36511"; "Barnes Collection"; "♂ genitalia on slide 2592, Oct. 11, 1939, J.F.G.C." [J. F. G. Clarke]

Discussion:—The specimen examined may actually be the holotype of *Agrotis quinquelinea* Smith, but there are so many discrepancies in the published record and the label data that it seems prudent to consider it as a syntype. Smith's reference in the original description to "the single female" probably was intended to convey the idea of a single specimen, a female. On the other hand his comparative statement could have been based only on the female sex, and therefore, conceivably, he could have had males also. The specimen examined is a male, but it would not be a surprise if Smith had erred in stating the sex. His statement in 1893 that the type was in the Edwards' collection is apparently not true. He frequently made such statements while he still had the specimen, intending apparently to send the specimen subsequently to the collection in which he stated it was housed. In this instance the specimen in the USNM was received from him on May 18, 1900 and listed in the type catalog as "Type," but it cannot be determined whether Smith meant it as *the* type or *a* type. I was unable to find a "Type" in the collection of Edwards in the American Museum of Natural History. Another discrepancy is the "Barnes Collection" label. If the specimen came to the USNM in 1900 there should be no such label on the specimen. It is possible that it may have been loaned to Barnes, that it was not returned until the Barnes collection was received by the U. S. National Museum, and that it then received the "Barnes Collection" label. Smith's usage of "The type. ." in 1893 indicates that he probably had only one specimen because he did not have a holotype concept. Smith may even have been thinking of the type of some other species when he made

the statement! Considering the number and range of demonstrable errors in Smith's total descriptive work, such a possibility is not unbelievable. Some workers may feel that the type should be considered lost and that a neotype should be designated. I am inclined to think that the specimen in the U. S. National Museum is the type and was the only specimen before Smith when he described the species. I cannot prove this to be the case; therefore, I have selected, labeled, and now designate the "Type" in the U. S. National Museum as the lectotype. Hampson (1903, p. 260) stated: "This species is unknown to me; figured from a photograph from type in U. S. Nat. Mus." The figure (plate LXIV, fig. 14) is stated to be a ♀ from California!

Euxoa quinta Smith, 1908, Ann. New York Acad. Sci. 18(2):97.

"*Habitat*: High River, Alberta (Mr. Thomas Baird); Kaslo, B. C., June 1, 30, July 7, 10 (Mr. J. W. Cockle)." "Three males and two females, all in good condition; received from Dr. James Fletcher."

Syntypes examined: 3 (All AMNH)

1) "Euxoa quinta Smith ♂ type"; "Kaslo, B. C."; "10.VII 05"; "J. B. Smith Collection Rutgers"
2) "Euxoa quinta Smith ♀ type"; "Kaslo, B. C."; "I.VI 06"; "J. B. Smith Collection Rutgers"; "slide Euxoa No. 5029 ♀" [Genitalia preparation by D. F. Hardwick]
3) "Euxoa quinta Smith ♂ cotype"; "High River, Alberta, Thos. Baird"; "J. B. Smith Collection Rutgers"

Other syntypes: 2 (Both CNC)

1) "Euxoa quinta Sm. ♂ co-type"; "7-VII 05"; "7.VII.1905, Kaslo, B. C., Coll. J. W. Cockle"; "PARATYPE, E. quinta Sm. No. 880; "SLIDE Eux No. 104a"
2) "Euxoa quinta Sm. ♀ cotype"; "30.VI.1906, Kaslo, B. C., Coll. J. W. Cockle"; "PARATYPE, E. quinta Sm. No. 880"; "SLIDE Euxoa ♀ No. ER 1637" [Genitalic preparation by E. Rockburne]

Discussion:—McDunnough (1950, p. 370) stated: ". . . ; *quinta*, holotype, male, High River, Alberta (Rutgers University, New Brunswick, New Jersey); paratype, male, Kaslo, British Columbia (C.N.C.)." Rindge (1955, p. 128) did not consider McDunnough's restriction as lectotype designation, but assumed McDunnough had erred in citing the type locality. I have selected, labeled, and now designate the "♂ cotype" from High River, Alberta in the American Museum of Natural History as the lectotype. This action is in line with the policy explained in the introductory remarks of this paper.

Chorizagrotis sordida Smith, 1908, Jour. New York Ent. Soc. 16:86.

"*Habitat.*—Kaslo, B. C., September 6, Mr. Cockle." "1 ♂ and 5 ♀ ♀, in fair or good condition."

Syntypes examined: 3 (2 AMNH and 1 USNM)

1) "Chorizagrotis sordida Smith ♂ type"; "Kaslo, B. C."; "6.IX.02"; "J. B. Smith Collection Rutgers"; "slide Euxoa No. 5040 ♂ [Genitalia preparation by D. F. Hardwick] [AMNH]
2) "Chorizagrotis sordida Smith ♀ type"; "Kaslo, B. C."; "J. B. Smith Collection Rutgers" [Abdomen broken from body.] [AMNH]
3) "Chorizagrotis sordida Sm. cotype"; "Kaslo, B. C., 7/26"; "Barnes Collection" [A ♀] [USNM]

Other syntypes: 1 (CNC)

1) "Chorizagrotis sordida Sm. co-type"; "Kaslo, B. C., Coll. J. W. Cockle"; "PARATYPE, C. sordida Sm. No. 882"; "SLIDE Euxoa ♀ No. ER3467" [Genitalic preparation by E. Rockburne]

One other specimen in the Canadian National Collection is probably also a syntype. It bears the correct label data, but it does not bear a Smith name label.

Discussion:—Because the "♀ type" is damaged, I have selected, labeled, and presently designate the "♂ type" in the American Museum of Natural History as the lectotype.

Agrotis soror Smith, 1888, Proc. U.S.N.M. 10:453.

"*Habitat.*—Montana." "Two ♀ specimens from Mr. Hulst furnish the types."

Syntypes examined: 1 (USNM)

1) "Agrotis soror Smith Type"; "Collection J. B. Smith"; "Type No. 92 USNM"; "♀ genitalia on slide 2320 E. L. Todd" [No locality label.]

Discussion:—There is a second specimen in the U. S. National Museum that was received from the Graef collection via the Brooklyn Museum in 1929. It has been entered in the type book under number 33729. It bears a small black-bordered label "soror Type" in what appears to be Smith's handwriting. But it is labeled also "Agrotis soror Sm., Ariz., Coll. Edw. L. Graef." I do not consider it to be a syntype. I have selected, labeled, and now designate the specimen bearing the label "Type No. 92 USNM" in the U. S. National Museum as the lectotype of *Agrotis soror* Smith.

Carneades territorialis Smith, 1900, Proc. U.S.N.M. 22(1203):436.

"*Habitat.*—Denver, October 12; Salida, August 10 (Oslar); Glenwood Springs, October 1–7 (Barnes), all in Colorado; Pullman, Washington, September 24 (Piper)." "Two males and three females are before me." "*Type.*—Cat. No. 4793, U.S.N.M." Smith, 1893, U.S.N.M. Bull. 44:78 states—"The type is in the National Museum."

Syntypes examined: 4 (3 USNM and 1 AMNH)

1) "Carneades territorialis Smith ♀ type"; "Denver, Col., X-12"; "Type No. 4793 USNM"; "36511"; "♀ genitalia on slide 2248 E. L. Todd" [USNM]
2) "Carneades territorialis Smith ♂ type"; "Denver, Col., X-12"; "Type No. 4793 USNM"; "36311"; "♂ genitalia on slide 2247 E. L. Todd" [USNM]
3) "Carneades territorialis Smith ♀ cotype"; "Glenwood Spgs., Colo."; "Barnes Collection" [USNM]

4) "Carneades territorialis Smith ♂cotype"; "Salida, Colo., 7-10-1898"; "J. B. Smith Collection Rutgers" [AMNH]

Discussion:—Both the "♂type" and "♀type" bear the USNM type number 4793. I have selected, labeled, and now designate the "♀type" in the U. S. National Museum as the lectotype. The missing syntype is the specimen from Pullman, Washington, September 24 collected by Piper.

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A NEW GENUS OF BRUCHIDAE FROM SOUTH AMERICA, WITH THE DESCRIPTION OF A NEW SPECIES

(COLEOPTERA)

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Seeds of trees and shrubs in the plant genus *Prosopis* are heavily attacked by species in at least eight genera of Bruchidae. *Prosopis* spp. seed pods provide important forage for cattle, sheep, goats and other wild and domesticated browsing animals. Massive infestations by bruchids reduce the food value of this forage and the generation of new growth.

On the North American continent, species in the genera *Neltumius* Bridwell, *Mimosestes* Bridwell, *Algarobius* Bridwell, and *Amblycerus* Thunberg, are known to attack *Prosopis* spp., and in South America the complementary genera are *Rhipibruchus* Bridwell, *Pectinibruchus* Kingsolver, and the new genus described herein. In addition, specimens tentatively identified as *Acanthoscelides longiscutus* (Pic) have been reared from *Prosopis*. Bridwell (1920) listed *Caryedon serratus* (Olivier) as well as *Algarobius* and *Mimosestes* in *Prosopis* on the Hawaiian Islands.

All of the bruchids in *Prosopis* on both continents belong to the subfamily Bruchinae as it is now understood. The species of *Neltumius* have been treated by Kingsolver (1964), and *Rhipibruchus* and *Pectinibruchus* by Kingsolver (1967). A revision of *Algarobius* species will soon be completed. As in many bruchid groups, the species within each of these genera are very similar externally, and male genitalia provide the chief source of determinant specific characteristics. Similarities in male genitalia often indicate species groups and genera for which external characteristics are subtle.

Scutobruchus, n. gen.

Elongate-ovate. Color yellowish-brown, brown or grayish vestiture on black or reddish integument. Pattern varying in intensity from unicolorous to light background with strongly contrasting dark spots or streaks. Legs red to brown.

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Antennal color same as integument of body except apical half of each segment often darker.

Head (fig. 11) rather broad; eyes prominent, deeply emarginate, not sexually dimorphic; frontal carina faintly indicated; antennae of both sexes as in fig. 17. Pronotum campaniform, lateral margins slightly arcuate, lateral carina only faintly indicated at base; disk convex, slightly channelled medio-basally. Elytra together slightly longer than wide; striae regular, undistorted basally, interstices of subequal width; third, fourth, fifth and sixth (occasionally also the second) striae each with small basal tooth. Scutellum nearly twice as long as wide, emarginate apically between acute terminal denticles. Pygidium sloping at about 30° from horizontal at base but vertical at apex; apex in male bent under apically to fit emarginate fifth sternite; apex in female not bent under, fifth sternite not emarginate; face of female pygidium without grooves or depressions. Basal abdominal sternite in male with oval, setose depression often filled with farinose deposit (fig. 7). Front and middle legs not modified; hind femur (figs. 9 & 10) swollen, sulcate ventrally; inner ventral margin with 1 long tooth and 2 or 3 denticles near apex, and with 2 or 3 very small denticles toward base nearly hidden in vestiture; hind tibia (figs. 9 & 10) nearly straight, with sharp mucro and 4 to 6 denticles on terminal margin, middle carina of outer face present or absent. Male genitalia without ventral valve but with strongly developed ventral keel on median lobe (figs. 5 & 15).

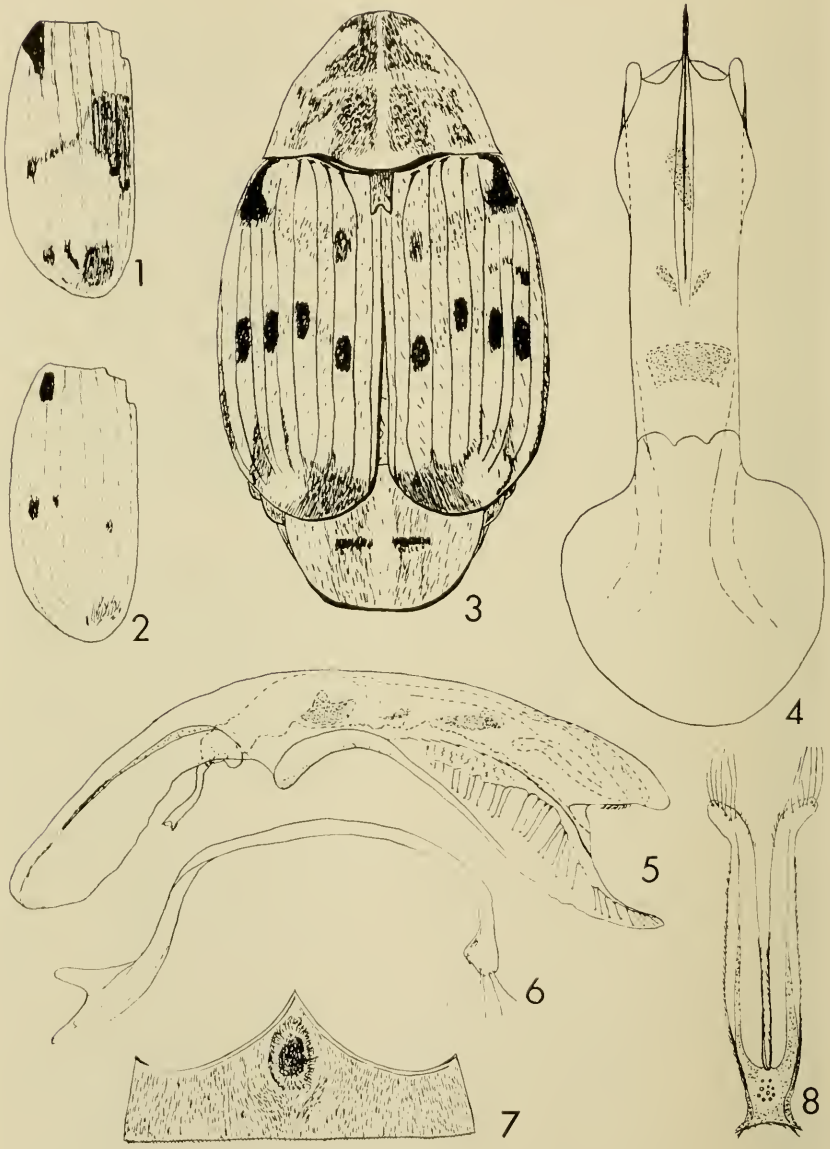
Type species.—*Bruchus ceratioborus* Philippi.

Scutobruchus is a near relative of *Algarobius* and both are closely related to *Acanthoscelides* (sens. str.) in the following characteristics: elytral striae normal with denticles at the extreme basal margin, armature of the hind femur consisting of 1 long tooth followed by 2 or 3 denticles, eyes not sexually dimorphic, antennae not sexually dimorphic, pronotal disk without prominent asperities and pronotum with an incomplete lateral carina or this completely lacking. *Scutobruchus* and *Algarobius* are similar to each other but differ from *Acanthoscelides* (sens. str.) principally in the elongated scutellum. *Scutobruchus* differs from *Algarobius* in having a basal abdominal fovea in the male, a keel on the median lobe of the male genitalia and the lack of pygidial sulci as is found in females of *Algarobius*. *Scutobruchus* differs from *Acanthoscelides* in the keeled median lobe and the basal abdominal fovea.

In the generic key to Bruchidae of the United States (Arnett, 1960), *Scutobruchus* will key to *Algarobius*.

Scutobruchus is apparently restricted to the drier, warmer areas of western and south central South America, as are its host plants, various species of *Prosopis*. *Scutobruchus ceratioborus* (Philippi) has been intercepted numerous times in Plant Quarantine inspections.

Two species are presently included in *Scutobruchus*—*ceratioborus* (Philippi) and the new species described here. I have examined specimens identified by Sr. J. M. Bosq of Argentina as *Bruchus vagenotatus* Pic which are identical with *S. ceratioborus*. I was informed



Figs. 1–8, *Scutobruchus ceratioborus* (Philippi): 1, dark phase color pattern, left elytron; 2, light phase; 3, dorsal habitus with intermediate phase; 4, median lobe, ventral; 5, median lobe, lateral; 6, tegmen, lateral; 7, basal sternite of ♂ abdomen, ventral; 8, lateral lobes, ventral.

by Mme. A. Bons of the Paris Museum that the type specimens of *Bruchus vagenotatus* had been destroyed by dermestid beetles before the Pic collection arrived at the Museum; thus, the positive identification of *vagenotatus* may never be made. However, on the basis of a lack of disagreement in the descriptions of *vagenotatus* and of *ceratioborus*, I believe that the two species are synonymous.

Scutobruchus ceratioborus (Philippi), n. comb.

Bruchus ceratioborus Philippi, 1859, p. 670; Pic, 1913, p. 20 (as *ceriatoborus*).
Algarobius ceratioborus: Olalquiaga Fauré, 1949, p. 89.
Acanthoscelides ceratioborus: Blackwelder, 1946, p. 759.
Bruchus vagenotatus Pic, 1938, p. 19. **New synonymy.**
Acanthoscelides vagenotatus: Blackwelder, 1946, p. 761.

Length.—3.5–4.5 mm. Width.—1.75–2.0 mm.

Color.—Integument reddish brown to piceous, legs and antennae correspondingly colored; eyes black; vestiture of yellowish brown to brown setae.

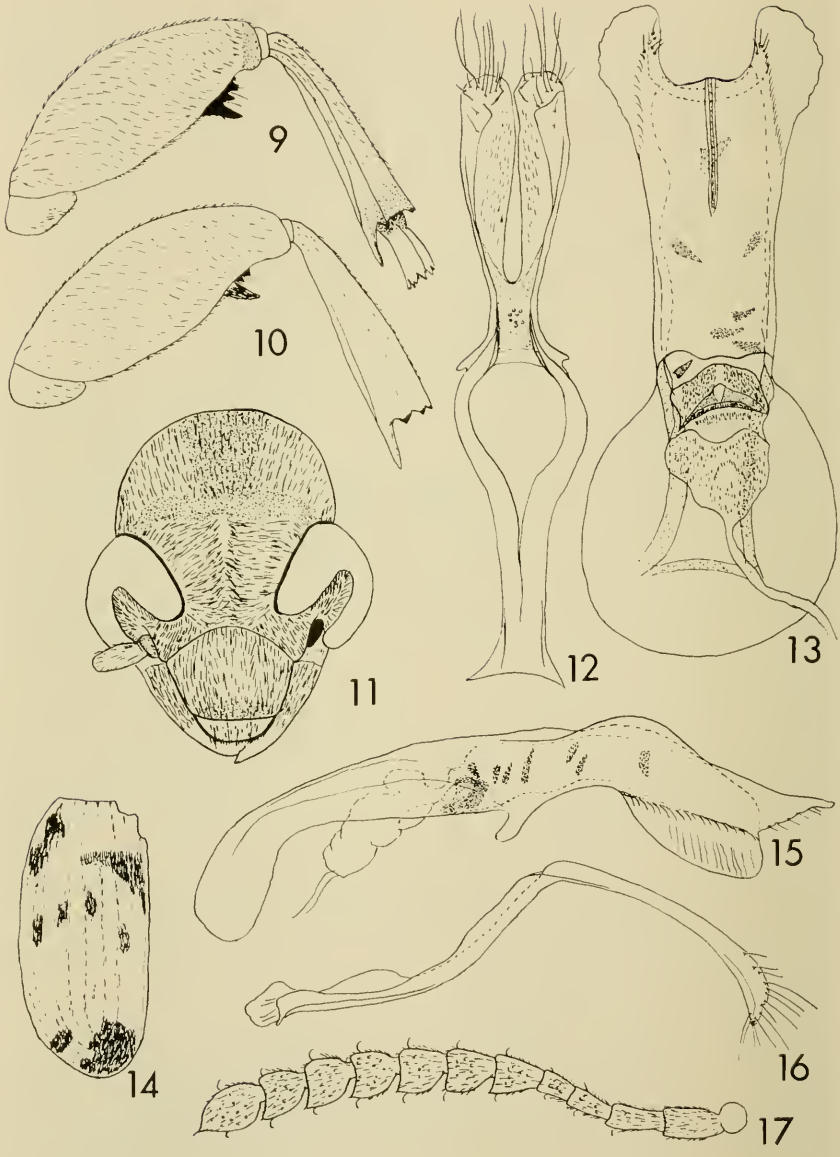
Head reddish, vertex with narrow or broad, vertical, piceous median stripe ending at and occasionally expanding laterally into transverse sulcus above each eye; clypeus usually darker basally; labrum reddish; antenna with apical half of each segment usually darker; post-ocular fringe gray. Protonum narrower than elytra at base; disk convex, punctulate, with foveate punctures medially; flanks, base and often a fine median line paler than disk. Elytra usually yellowish brown with brown pattern, intensity of pattern varying from nearly unicolorous (fig. 2) to that of fig. 3, to dark specimens with diamond-shaped median blotch (fig. 1). Vestiture of ventral parts paler than dorsal. Pygidium elliptical with truncate base, basic color as on elytra; vestiture yellowish gray with paler median streak and lateral margins, usually with darker vague spot on either side near median line about one-third from base (fig. 3). Hind femur with a long tooth and 3 denticles near apex of inner margin (fig. 9); hind tibia with carina on outer face (fig. 9). Male genitalia as in figs. 4, 5, 6, 8; apex of median lobe with long ventral apical keel; ventral valve absent; armature of internal sac as illustrated; lateral lobes fused basally, divergent apically with setiferous apices.

Lectotype ♂ here designated from original series of 4 cotypes deposited in Museo Nacional de Historia Natural, Santiago, Chile. Type series examined through the courtesy of Dr. Vicente Pérez D'Angello and Dr. Guillermo Kuschel.

Type locality.—Valdivia Province, Chile.

Range.—Chile, Argentina, Peru.

Locality Records.—CHILE: La Ligua, January; Vallenar; Coquimbo, Feb. 22, 1947, D. S. Bullock. PERU: Piura, Aug. 18, 1944, P. A. Berry; Chiclayo, Apr. 20, 1936, J. E. Wille; Canete, Jan. 25, 1941, E. J. Hambleton. ARGENTINA: Buenos Aires; Plant Quarantine interception, Washington, D.C., May 15, 1946; Saujil de Catamarca, June 6, 1927, M. Kisliuk; Monogasta, June 12, 1927, M. Kisliuk; Oran, Mar. 8, Aug. 16, 1917; Tucuman, Dpto. Trancas, San Pedro de Colalao, Mar. 7, 1953, A. Teran, *ex Prosopis nigra* (Gris.) Hier. and *P. alba* Gris.; Tucuman, Amaicha del Valle, summer of 1953, A. Teran, *ex*



Figs. 9, 11, 17, *Scutobruchus ceratioborus* (Philippi): 9, hind leg, lateral; 11, head, cephalic; 17, antenna. Figs. 10, 12–16, *S. gastoi*, n. sp.: 10, hind leg, lateral; 12, tegmen, ventral; 13, median lobe, ventral; 14, color pattern, holotype, left elytron; 15, median lobe, lateral; 16, tegmen, lateral.

Prosopis torquata (Lag.) DC.; Salta, Alemania, Rio las Conchos, Sept. 7, 1959, A. Teran, *ex Prosopis* sp. flowers; La Pampas, Mar. 1962, Llano, *ex Prosopis caldenia* Burkart; Formosa, Ing. Juarez, Jan. 7, 1949, R. Golbach.

Bosq (1943) lists the following localities for *Bruchus vagenotatus* —ARGENTINA: Santiago del Estero, Santa Fe, Cordoba, La Pampa, San Juan La Rioja, Tucuman. PERU.

Host Plants.—Zacher (1952) lists: *Prosopis siliquastrum* (DC.), (Synonym of *chilensis* (Mol.) Stuntz), *algarobilla* Gris., *nigra*; *Acacia farnesiana* (L.) Willd.; *Caesalpinia brevifolia* (Clos.) Bens.; *Cordia trichotoma* (Vell.) Arrab. *ex* Jonst. The latter three records need to be verified because of possible misidentifications of either the host or the bruchid. Other host records are given above with the locality records.

Bosq (1943) lists the following hosts for *Bruchus vagenotatus*: *Prosopis alba*, *Prosopis nigra*, *Prosopis algarobilla* and *Prosopis ruscifolia* Gris.

Scutobruchus gastoi, n. sp.

Length.—2.50–3.00 mm. Width.—1.25–1.50 mm.

Color.—Integument reddish brown with some areas nearly piceous; antennae reddish to smoky gray; eyes black; vestiture of gray, yellowish or brown setae.

Head with vertex reddish or with darker median stripe; eyes moderately prominent, emargination about half length of eye; clypeus and labrum red; antennal segments as in *S. ceratioborus* (fig. 17), reddish with apical half of each segment usually darker. Pronotum campaniform, lateral margins slightly arcuate; disk evenly convex, faintly sulcate in middle of basal lobe; punctation dense and irregular on disk and flanks; lateral carina obsolete; vestiture yellowish, slightly denser on flanks, on either side near apex and in a narrow median streak from apex to basal lobe. Scutellum about 1.5× as long as wide, bifid apically with posterior angles acute; vestiture dense, yellowish. Elytra together slightly longer than wide; striae regular, not distorted, 2, 3, 4, and 5 denticulate basally; pattern varying from unicolorous to extreme of fig. 14, but not as dark medially as extreme pattern type in *ceratioborus*. Pygidium elliptical with base truncate; integumental color reddish, often darker laterally; vestiture yellowish gray, denser medially, usually condensed into median basal triangle; female often with vague darker spots on either side near base. Ventral surfaces with uniform gray or yellowish gray vestiture. Basal abdominal depression in male nearly half of length of basal sternite. Legs red, shape as in *ceratioborus*, except femoral armature consisting of one long tooth and two smaller denticles; tibia lacking carina on outer face (fig. 10). Male genitalia as in figs. 12, 13, 15, 16; short, ventral keel of median lobe rounded apically; lateral margins of apex of median lobe expanded, foliate; lateral lobes not divergent apically.

Holotype ♂. CHILE: Canchones, Tarapaca, June, 1966, in seeds of *Prosopis tamarugo* Philippi, J. Gasto, collector. USNM 69237.

Paratypes, 7 ♂♂, 7 ♀♀. Same data as holotype. Eight paratypes deposited in Museo Nacional de Historia Natural, Santiago, Chile.

Scutobruchus gastoi differs from *S. ceratioborus* in the lack of a

carina on the outer face of the hind tibia, in the consistently smaller size, in the presence of two denticles instead of three following the long tooth on the ventral margin of the hind femur and in details of the male genitalia. Its host plant is restricted to a small area of northern Chile.

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BEAUTY VS. UTILITY IN MOUNTING SMALL FLIES ON PAPER POINTS

Several sets of directions for mounting insects recommend bending the tip of a paper point downward and cementing the specimen to it with the side of the specimen against the bent-down surface of the point and the back of the specimen upward. This results in a pretty mount with the insect in a "normal" position, but in working with small Diptera thus mounted the result is that one must try to hold the pin upside-down most of the time in order to see many characters on the prosternum, legs, and abdomen. The labels are then usually in the way and the point of the pin is upward. I believe that small flies (Diptera) are better mounted on the tip of an unbent point lying on the left side with the legs toward the pin and the head directed forward when the point is to the left. The tip of the point should be as low on the specimen as practical, just above the coxae. This results in a mounting that can be used with the pin more or less horizontal and stuck into a cork.—George C. Steyskal, *Systematic Entomology Laboratory, ARS, U.S. Dept. of Agriculture.* Mail address: *c/o U. S. National Museum, Washington, D. C. 20560.*

NEW HOPLISOIDES FROM THE UNITED STATES
(HYMENOPTERA: SPHECIDAE)

R. M. BOHART, *Department of Entomology, University of California, Davis 95616*

Five species of the Nyssonine genus *Hoplisoides* Gribodo are described to facilitate a forthcoming revision. This genus is distinguished in the tribe Gorytini by the following: Hindwing media diverging at cu-a, omaulus present and continued to midline of venter by the acetabular carina, episternal sulcus not directed forward toward omaulus, tergite I sessile, propodeum not coarsely areolate, and female forepulvilli not larger than others.

Of the species described below, four belong to the *denticulatus* group characterized by an angled hindwing cu-a and unusual pubescence on male sternites IV to V at least. The fifth species, *glabratus*, belongs to the *tricolor* group in which male tergite VII is exserted.

Holotypes of *glabratus*, *carinatus*, and *floridicus* are in the Entomology Museum of the University of California at Davis, *projectus* is in the California Academy of Science, and *cazieri* is in the American Museum of Natural History.

Hoplisoides carinatus R. Bohart, n. sp.

Male holotype: Length 8.0 mm. Black, marked with yellow as follows: clypeus, frons laterally, scape and pedicel in front, pronotal ridge and lobe, weak scutellar spots, distal femoral spot, tibial stripe, foretarsi partly, apical bands on tergites becoming very broad posteriorly, lateral spots on sternites II–VI. Wings mostly clear, forewing yellow along costa and in stigma, a dark cloud covering marginal cell, one-half of second submarginal and one-third of third submarginal. Pubescence silvery, abundant, pulverulent; sternites IV to VI and III laterally with dense erect pubescence. Punctation moderate to sparse, macropunctures separated by 1 to 2 diameters on scutum, 3 to 4 on mesopleuron and propodeum laterally, 1 to 4 on tergite I, 1 to 3 in yellow bands of tergites II to VI. Clypeus convex, a little more sharply rounded subapically, about 1.5 times as broad as long, least interocular distance about equal to length of clypeus or scape, flagellomere I about 1.5 times as long as broad, II to IV about as broad as long, VII projecting beneath VIII almost to IX, polished spots under VIII to X, length of XI about 1.7 times breadth, sternaulus complete; metapleuron narrow and parallel sided below upper pit, lower pit much smaller than midocellus; forewing cu-a sharply bent just before cubitus; propodeal enclosure with 14 complete longitudinal ridges; sternite IV with a faint lateral denticle, V with an oblique lateral carina which is low and of even height throughout; tergite VI narrowly rounded at apex, sides angled at about 75 degrees, VII concealed.

Female: Differing in color from male. Head and thorax about half yellow and half red, abdomen with venter mostly red, dorsum mostly yellow; clypeus red basally and yellow apically, frons and scutum mostly red, scutellum yellow and metanotum usually so, pygidium extensively yellow. Wings about as in male, but with a light brownish yellow median streak in forewing. Pygidium mostly smooth between scattered macropunctures, limiting carinae gently curved.

Holotype male (UCD), Madera Canyon, Santa Cruz Co., Arizona, 4880 feet, June 27, 1963 (F. D. Parker). Paratypes, 32 males, 7 females from Arizona: Sedona, Continental, Phoenix, Toltec, Superior, Madera Canyon, Tucson, Nogales, Apache, Sahuarita, Rock Spring, Bowie, San Simon. Other paratypes, 23 males from Sonora, Mexico: Cocorit (F. Parker, L. Stange), near Magdalena (F. Parker, L. Stange). Dates of collection are April to July, and October.

A closely related species, *confertus* (W. Fox), differs in the male by its much higher carina on sternite V. This carina is nearly as high as long and higher posteriorly than anteriorly. In *carinatus* the carina is low throughout. Females of the two species are quite similar. In *carinatus* the forewing has a lighter brown streak and the pygidium is extensively yellow rather than all red.

Hoplisoides cazieri R. Bohart, n. sp.

Male holotype: Length 8.5 mm. Black to dark brown, marked with yellow as follows: mandible spot, clypeus, inner orbit, scape and pedicel in front, pronotal ridge and lobe, scutellar band, femora and tibiae within, fore and midtarsi partly, moderate apical bands on tergites I to IV, V and VI mostly, apical bands on sternites II to VI; flagellum reddish brown in front; wings mostly clear, forewing a little stained medially, a dark cloud in marginal cell, two-thirds of second submarginal and one-third of third submarginal, stigma deep yellow. Pubescence silvery, pulverulent, mesopleuron ventrally with short thick pile, sternites III to V with dense erect pubescence, VI practically bare. Punctation fine to coarse, mostly separated by about a puncture diameter but closer on yellow areas of tergites II to VI; punctures of scutellum, metanotum and yellow part of tergite I sparse. Clypeus convex, bulging a little subapically, about twice as broad as long, least interocular distance about equal to length of scape but greater than clypeal length; flagellomere I about 1.6 times as long as broad, II to V as broad as long, VI 1.5 times and VII 2.0 times as broad as median length; VII reaching base of IX beneath, polished or concave spots beneath VIII to XI, XI about 1.7 times as long as broad; sternaulus weak, fading anteriorly; metapleuron narrow and parallel sided below upper pit, lower pit much smaller than midocellus; forewing cu-a sharply rounded just before cubitus; propodeal enclosure with 14 ridges; sternites IV and V without lateral denticles or carinae; tergite VI narrowly rounded at apex, sides angled at about 75 degrees, VII concealed.

Female: Markings about as in male. With a dark mediobasal clypeal spot, a yellow upper mesopleural spot and a metanotal band, a darker brown streak along middle of forewing, sternites V to VI nearly all yellow. Tarsal and tibial setae of mid and hindlegs unusually stout. Pygidium entirely yellow, coarsely and closely striatopunctate, rather broadly rounded at apex, lateral carinae gently curved.

Holotype male (American Museum of Natural History), Carr Canyon, Huachuca Mts., Cochise Co., Arizona, June 3, 1952 (M. Cazier, W. Gertsch, R. Schrammel). Paratype female, Molino Basin, Mt. Lemmon, near Tucson, Arizona, May 20, 1953 (A. and H. Dietrich, Cornell Univ.).

H. cazieri belongs to the *denticulatus* group and considering the unarmed male sternites and broad flagellomeres VI and VII in the male, is related to *floridicus*. There are many color differences, however. In addition the male of *cazieri* has sternite VI nearly bare, the propodeum posteriorly in both sexes is much less densely punctate, male flagellomeres II to V are not angled beneath in profile, female leg setation is much stouter, and the female pygidium is closely striatopunctate instead of polished with scattered macropunctures. The species is named for M. A. Cazier who has contributed greatly to our knowledge of wasps in the southwest.

Hoplisoides floridicus R. Bohart, n. sp.

Male holotype: Length 8.5 mm. Black, marked with yellow and red. Yellow are: mandible mostly, clypeus, lower frons, lower inner orbit, scape and pedicel, pronotum all across, lateral scutal dot, upper mesopleural spot, scutellum mostly, legs partly but with much red infusion, apical margins of tergites I to V, broadened laterally on I to III, especially narrow on IV to V; red are: infusion with yellow on the thorax, broad median area across tergites I and II, sternite I, apical band on sternite II, lateral spot on III; wings light brown, paler toward base and trailing edge, darker in marginal cell and most of second and third submarginals, a light brownish streak on forewing, stigma yellow. Pubescence silvery, moderately abundant, pulverulent; sternites III to VI with dense erect pubescence, thickest laterally. Punctation rather fine and close on upper frons, coarse on scutum and pleuron but averaging one puncture diameter apart, irregularly coarse and close on propodeum posteriorly, rather fine and sparse on scutellum and tergite I, fine to moderate but well spaced on tergites II to V, rather coarse and close on VI. Clypeus convex, a little bulging subapically, about 1.8 times as broad as long; least interocular distance about 1.2 times median clypeal length; flagellomere I about 1.3 times as long as broad, II to V a little broader than long, VI and VII about 1.5 times broader than long, VII projecting beneath and almost touching IX, polished spots beneath VIII to XI, length of XI about 1.7 times breadth; sternaulus strong and complete; metapleuron nearly parallel sided below upper pit, lower pit much smaller than midocellus; forewing cu-a sharply bent just before cubitus; propodeal enclosure with 10 longitudinal ridges; sternites IV and V without lateral denticles or carinae; tergite VI narrowly rounded at apex, sides angled at about 75 degrees, VII concealed.

Female: About as male. Facial markings including first few flagellar segments infused with red, pleuron sometimes mostly red, metanotum marked with yellow or red, propodeum with two large red spots, wings darker brown. Pubescence becoming fulvous on thorax. Pygidium smooth between scattered macropunctures, limiting carinae gently curved.

Holotype male (UCD), Orlando, Florida, March, 1944 (R. and G. Bohart). Paratypes, 3 males, 7 females, March to October from Florida: Orlando, Lake Placid, Fort Lauderdale, Highlands Hammock State Park, Brooksville, Lacoochee, Cocoa. Paratypes in collections of University of Kansas, Museum of Comparative Zoology at Harvard, and G. R. Ferguson.

A relationship with *denticulatus* Packard is obvious. However, the thoracic venter of male *floridicus*, while pubescent, lacks the rather long pile found in *denticulatus*. Also, *floridicus* has no denticles on male sternite V and flagellomeres VI to VII are considerably more produced downward. Females of the two species are very close structurally. In my material *denticulatus* females always have the clypeus mottled black and yellow or all black instead of reddish yellow. Also, the metanotum of *denticulatus* is black or nearly so and that of *floridicus* is extensively yellow or red. One other species from Florida with similar appearance is *placidus* F. Smith. However, it is in a different species group with gently curved hindwing cu-a, large orifice on metapleuron below, no unusual pubescence of male sternites III to VI, more slender antennae and male hindtarsi, and bent lateral pygidial carina in the female. There is a structural similarity between *floridicus* and *cazieri*, but the latter has a weak sternaulus and other differences mentioned under the latter species.

Hoplisoides projectus R. Bohart, n. sp.

Male holotype: Length 9.0 mm. Black, marked with yellow as follows: mandible, clypeus, frons below and laterally, scape and pedicel in front, pronotal ridge and lobe, scutellum, metanotal dot, lateral dot on scutum, large propodeal spots, upper mesopleuron, femora partly, tibiae and tarsi mostly in front, broad and irregularly margined apical bands on tergites I to V, broadest laterally, that on I deeply V-shaped; spot on VI; lateral spots on sternites II to IV; reddish brown are: femora partly, hindtarsus apically. Wings smoky, stigma brownish yellow, a dark cloud in marginal cell, upper three-fourths of second submarginal and two-thirds of third submarginal. Pubescence silvery, abundant, pulverulent; sternites IV to VI and III laterally with dense erect pubescence. Punctation moderate to sparse, macropunctures separated by 1 to 2 diameters on scutum, 3 to 4 on mesopleuron and propodeum laterally, sparse and fine on tergite I, more coarse on II–V, coarse and rather close on VI. Clypeus convex, a little more sharply rounded subapically, nearly twice as broad as long, least interocular distance greater than length of clypeus or scape, flagellomere I about 1.5 times as long as broad, II to IV about as broad as long, VII projecting beneath VIII and almost reaching IX, polished spots beneath VIII to XI, about 1.7 times breadth; sternaulus complete; metapleuron narrow and parallel sided below upper pit, lower pit much smaller than midocellus; forewing cu-a sharply bent just before cubitus; propodeal enclosure with 10 longitudinal ridges; sternite IV with a faint lateral denticle, V with an oblique lateral carina which is low but rounded in profile and highest near anterior end; tergite VI narrowly rounded at apex, sides angled at about 80 degrees; VII concealed.

Female: Yellow markings of gaster much more extensive than in male, covering most of dorsum; band on I deeply V-notched at base, that of II bordered with a thin black band basally; tergite VI all dark red; markings of venter about as in male. Red are: clypeus mostly, narrow orbital line, entire antenna in front but darkening toward apex, legs mostly. Metanotum yellow. Wings about as in male but with a light brownish yellow median streak in forewing. Pygidium with

coarse, irregular striae interspersed with elongate punctures, apex blunt, lateral carinae gently curved.

Holotype male (California Academy of Sciences), Los Banos, Merced Co., California, May 23, 1918 (E. P. Van Duzee). Paratypes, 3 males, 1 female, from California: Tracy (P. D. Hurd, CIS), Hanford (F. H. Surber, E. I. Schlinger, UCD), Lindsay (W. Davidson, USNM). Paratypes were collected in July and August.

This San Joaquin Valley species is similar to both *confertus* and *carinatus*. The male of *projectus* has the eyes more widely spaced than in the other two and the lateral carina of sternite V is lower than that of *confertus* and more rounded than that of *carinatus*. In the female the pygidium of *projectus* is more completely and coarsely longitudinally striate than in the other two species. In the material before me, the yellow band of tergite I in both sexes of *projectus* has a much sharper and deeper V-incision than in the others.

Hoplisoides glabratus R. Bohart, n. sp.

Male holotype: Length 6.5 mm. Black, extensively marked with red and pale yellow. Orange-red are: thorax laterally and propodeum except enclosure, legs except for first two pair which have tibiae and tarsi all yellow as well as yellow marks on coxae and femora, wing bases, tergites I and II broadly at base, venter of gaster mostly; yellow are: mandible mostly, labrum, clypeus, lower frons and attached broad orbital stripe nearly to level of midocellus, scape and pedicel in front, pronotal ridge and lobe, scutellum mostly, legs as given above, tergites I to V broadly across apex, spot on tergite VI, scattered marks on sternites II to IV; wings light brown with darker spot covering marginal, second submarginal and most of third submarginal cells, stigma orange-yellow. Pubescence short, mostly inconspicuous, silvery, becoming reddish on vertex and notum. Punctation nearly absent, a few fine punctures which are most noticeable between ocelli and on tergites III to VII. Clypeus smoothly convex, about twice as broad as long; least interocular distance about 1.2 times median clypeal length; flagellomere I a little longer than broad, II to VII broader than long, VII broadest, IV nodose beneath, VIII to X longer than broad and with polished concavities beneath, XI obconic and 3.0 times as broad as long; sternaulus complete and without associated teeth; metapleuron narrow, tapering gradually below, lower pit much smaller than midocellus; forewing cu-a slightly curved near cubitus; propodeal enclosure smooth except for median groove; tergite VI rounded distally, VII exposed at tip.

Female: About as in male except: Length 7 to 9 mm. Antenna and face almost to level of midocellus all yellow, clypeus sometimes a little red medially, outer orbit and venter of thorax mostly yellow, gaster mostly red but darkening posteriorly; tergite I with two whitish spots, II and III with irregular narrow ivory bands, IV and V ivory spotted. Antenna evenly and slightly clubbed, flagellomere I about 1.5 times as long as broad; pygidium forming an angle of 45 degrees, surface pruinose and with separated macropunctures.

Holotype male (UCD), Granite Pass, 18 miles north of Rodeo, New Mexico, on *Baileya pleniradiata*, August 25, 1958 (R. M. Bohart). Paratypes, 24 males, 106 females, near Rodeo, New Mexico, August

and September (R. Bohart, D. Linsdale, P. Hurd, H. Evans, *et al.*). Metatypes, 4 males, 12 females from localities as follows: Arizona: Pearce, Willcox, Douglas, Portal; New Mexico: Deming, San Antonio; Colorado: Colorado Springs; Texas: Odessa, Marfa.

This strikingly different species is apparently related to *tricolor* Cresson which also has male tergite VII exserted and a similar female clypeus. However, *glabratus* differs from *tricolor* as well as from most other *Hoplisoides* by the nearly impunctate pleuron. A unique feature is the all lemon yellow antenna and frons in the female. The ventrally nodose flagellomere IV in male *glabratus* is differentiating, also.

BOOK REVIEW

The Pollen-Collecting Bees of the Anthidiini of California (Hymenoptera: Megachilidae). By A. A. Grigarick and L. A. Stange. Bulletin of the California Insect Survey, volume 9, 113 pp., 229 figs. University of California Press, Berkeley and Los Angeles. 1968. Price: $2.50.

This is a detailed taxonomic treatment of the California bees of the non-parasitic genera of the tribe Anthidiini, family Megachilidae. They comprise the genera *Trachusa* Panzer, *Heteranthidium* Cockerell, *Anthidium* Fabricius, *Callanthidium* Cockerell, *Dianthidium* Cockerell, and *Anthidiellum* Cockerell. The parasitic Anthidiini (which are not included) are principally the genera *Stelis* Panzer, *Chelynia* Provancher, and *Dioxys* Lepeletier and Serville.

The Anthidiini and Megachilini make up the subfamily Megachilinae, and the Megachilini of California have already been treated in 1955 by Hurd and Michener. This was published as volume 3 of the *Bulletin* of the California Insect Survey.

The non-parasitic (pollen-collecting) Anthidiini amount to 42 species in California. By far the largest genus is *Anthidium* with 19 species, followed by *Dianthidium* with 13. Heteranthidium has only 4 species, and *Trachusa*, *Callanthidium*, and *Anthidiellum* have but 2 California species each. The authors give a characterization of the tribe and a key to the genera that occur in California. They also give keys to males and females of the species of all the included genera. They illustrate the diagnostic structural characters. A complete taxonomic and biologic bibliography is given for each species, and the characters of each species are discussed, emphasizing similarities and differences between related species. Specific descriptions are not included. The known biological information about each species is given, with references to sources.

A spot map showing the distribution within California is given for every species in this work, and the California distribution records are given in full. The males of 6 species are illustrated at many times life size in lateral aspect, the drawings beautifully executed and clearly reproduced. There are 2 pages of photographs of nests.

This volume is printed in near-black offset, on a large 7- × 9-inch, double column page.—B. D. Burks, *Systematic Entomology Laboratory, Entomology Research Division, ARS, USDA.* Mail address: *c/o U. S. National Museum, Washington, D. C. 20560.*

SOCIETY MEETINGS

756th Regular Meeting—December 14, 1967

The 756th regular meeting of the Society was called to order by the President, Louis G. Davis, on December 14, 1967 at 8:00 p.m. in room 43, U. S. National Museum. Twenty-three members and nine guests were in attendance. Minutes of the previous meeting were approved as read. *Richard A. Newkirk, F. E. Wood,* and *Sueo Nakahara* were received into the Society. The names of *Gordon D. Gill* and *Richard G. Dearborn* were read for the first time as candidates for membership.

President Davis presented a report of the activities of the Society during his tenure of office and called upon Dr. A. K. Burditt to present the Treasurer's report for 1967. The slate of candidates for office in 1968 proposed by the Nominating Committee was unanimously elected by the members present.

Mr. V. E. Adler commented briefly on the glow worms of New Zealand and showed an excellent series of slides illustrating his remarks. Dr. R. I. Sailer exhibited a slide and discussed the bites of the fire ant. The principal speaker for the evening, Mr. A. B. Amerson, presented an interesting illustrated lecture on collecting techniques for ectoparasites, with special emphasis on bird mites he collected as a member of the Pacific Ocean Biological Survey.

President Davis requested that Dr. F. W. Poos, Honorary Member, escort Dr. R. H. Foote to the podium where he was installed as the President for 1968. Following the introduction of visitors, the meeting was adjourned by President Foote at 9:45 p.m.—Respectfully submitted, RALPH A. BRAM, *Recording Secretary*

757th Regular Meeting—January 4, 1968

The 757th regular meeting of the Society was called to order by the President, Dr. R. H. Foote, on January 4, 1968 at 8:00 p.m. in room 43, U. S. National Museum. Twenty-four members and seven guests were in attendance. Minutes of the previous meeting were approved as read. *Gordon D. Gill* and *Richard G. Dearborn* were received into the Society.

Dr. Foote outlined recent changes in the organizational structure of the Insect Identification and Parasite Introduction Research Branch of the Entomology Research Division, USDA. T. L. Bissell showed pictures of the track of a syrphid larva made December 14, 1967 in the dew on the top of an automobile. The track consisted of an intricate series of loops with one comparatively straight run south to north. The larva had dropped to the car from a willow oak tree. On the same tree were small colonies of the giant bark aphid, *Logistigma caryae* (Harris). One colony of six live nymphs and numerous eggs, found on January 4, was exhibited.

The first scheduled speaker for the evening was Ira A. Lane who discussed various problems which presently challenge the Federal-State plant quarantine structure for plant pest protection. The second speaker, Dr. A. K. Burditt, Jr., presented an interesting, illustrated account of his experiences with the commodity treatment for tropical fruit flies, particularly in Hawaii.

Following the introduction of visitors, the meeting was adjourned by President Foote at 9:45 p.m.—Respectfully submitted, RALPH A. BRAM, *Recording Secretary*

758th Regular Meeting—February 1, 1968

The 758th regular meeting of the Society was called to order by President R. H. Foote on February 1, 1968 in room 43, U. S. National Museum. Thirty-four members and seven guests were in attendance. Minutes of the previous meeting were approved as read. The names of the following individuals were read for the first time as candidates for membership: *Kenneth E. Weisman, J. Hal Arnell, David E. Leonard, Frank W. Fisk, Harold N. Greenbaum*, and *Marc Roth.*

Helen Sollers-Riedel announced that the tentative date of June 3, 1968 has been set for the annual joint dinner meeting with the Insecticide Society of Washington. Dr. Foote commented briefly on certain aspects of the tremendous expansion of scientific literature. He also noted that the Society has been designated an Institutional Organization by the Smithsonian Institution and is therefore exempt from fees normally charged for use of the meeting room. L. G. Davis exhibited an early copy of "The Gillett Infestation," a newsletter from the Department of Entomology, Colorado State University, and advised that publication is being resumed after a lapse of a number of years. F. E. Wood reported on rearing the grasshopper, *Melanoplus punctulatus*, from eggs collected from the needles of fallen pines on the eastern shore of Maryland.

Mr. Louis G. Davis, the first scheduled speaker for the evening, presented the retiring president's address entitled: "Cooperative Insect Surveys in the United States." Mr. Davis reviewed the history and outlined the present status of cooperative insect surveys. Ed Taylor followed with an interesting, illustrated discussion of bioenvironmental techniques as supplements to chemical insect control. Included in this discussion were several recent examples of successful control of insect pests by methods other than chemical.

Following the introduction of visitors, the meeting was adjourned by President Foote at 9:45 p.m.—Respectfully submitted, RALPH A. BRAM, *Recording Secretary.*

759th Regular Meeting—March 7, 1968

The 759th regular meeting of the Society was called to order by the President on March 7, 1968, in room 43, U.S. National Museum. Thirty-nine members and twelve guests were in attendance. Minutes of the previous meeting were approved. The following individuals were received into the Society: *Kenneth E. Weisman, J. Hal Arnell, David E. Leonard, Frank W. Fisk, Harold N. Greenbaum*, and *Marc Roth.* The following names were read for the first time as candidates for membership: *Vikram Prasad, Ragnar K. Kinzelbach*, and *A. Blanchard.*

Mr. M. Leonard reported that his good friend, Dr. C. P. Alexander, is nearing his long-standing goal of describing 10,000 new species of craneflies. T. J. Spilman exhibited a heavily damaged wooden beam from an old house in Washington, D.C. The causative insect could not be found, but the damage and frass are very characteristic of the old-house borer, *Hylotrupes bajulus* (L.), a cerambycid. He also exhibited Styrofoam, a styrene plastic, which had been heavily tunneled by the lesser mealworm, *Alphitobius diaperinus* (Panzer), a tenebrionid. Many larvae, pupae, and adults were found in the tunnels; tunneling was probably done by larvae searching for or making pupation sites. The Styrofoam had been used as insulation in turkey shelters in Minnesota. The insect is

often found in chicken litter in coops. Dr. A. B. Gerney reported on a recent trip to the Philadelphia Academy of Science.

The first scheduled speaker of the evening, Ivan Rainwater, discussed current measures to publicize the work of the Plant Quarantine Division, U.S. Department of Agriculture, and introduced an enjoyable, new film, "Among Your Souvenirs." Dr. Lloyd V. Knutson then presented a most interesting, well illustrated account of his research on the biology of snail-killing flies in Europe.

Following the introduction of visitors, the meeting was adjourned by President Foote at 10 p.m.—Respectfully submitted, RALPH A. BRAM, *Recording Secretary.*

760th Regular Meeting—April 4, 1968

The 760th regular meeting of the Society was called to order by President R. H. Foote on April 4, 1968 at 8 p.m. in the regular meeting place. Minutes of the previous meeting were approved as read. *Vikram Prasad*, *Ragnar K. Kinzelbach*, and *A. Blanchard* were received into the Society. The name of *Carlos Flechtmann* was read for the first time as a candidate for membership.

Dr. J. Kingsolver showed seeds of *Mucuna* sp., a vining leguminous plant from Central and South America which is the host of two or three species of large Bruchidae, also exhibited, of the genus *Caryedes*. Also exhibited was a paper by Patricia Vaurie of the Museum of Natural History reporting that she had reared 25 bruchids from one of these seeds. Dr. Kingsolver then showed plastic artificial poinsettia leaves used as Christmas decorations in an Indianapolis department store. Leaves had been partially eaten by American cockroaches. Also exhibited were samples of feces of these cockroaches containing red, green, white, and black colors from the plastic leaves which had not been digested.

The first scheduled speaker for the evening, Clyde F. Rainwater, related some of his experiences with and outlined the objectives of the PL 480 Agricultural Research Program, with particular reference to Entomology in India and Pakistan. The second speaker, Dr. Maynard J. Ramsay, discussed international training in plant quarantine. His well illustrated presentation concluded that both the government which sends individuals for training and the U. S. Government benefit from such programs.

Following the introduction of visitors, the meeting was adjourned by President Foote at 10 p.m.—Respectfully submitted, RALPH A. BRAM, *Recording Secretary.*

NOTICE TO CONTRIBUTORS

Effective July 1, 1968, all manuscripts submitted for publication in the Proceedings, including notes of one page or less, **must be accompanied by an abstract** suitable for publication. The abstract must be typed on a separate sheet, should be brief (not more than 3% of the original), and written in whole sentences, not telegraphic phrases. Abstracts are not printed with notes of one page or less but will be sent to Biological Abstracts when the notes are published. Therefore, precede the abstract for notes with a paragraph giving the author's name, his affiliation in parentheses, the title of the article, and the abbreviated name of the journal. These abstracts will be printed beginning with the March, 1969, issue of the Proceedings.

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First page—The page preceding the text of the manuscript should include (1) the complete title, (2) the order and family in parentheses, (3) the author's name or names, (4) the institution with city, state and zip code or the author's home city, state and zip code if not affiliated, (5) in the upper left hand corner, the complete name and address to which proof is to be sent.

Names and descriptions of organisms—The first mention of a plant or animal should include the full scientific name with the author of a zoological name *not* abbreviated. Descriptions of taxa should be in telegraphic style.

References—Citations in the text of papers longer than one printed page should be by author and date and should refer to a list of concluding REFERENCES listed alphabetically in the following format:

> Muesebeck, C. F. W. 1963. Host relationships of the Euphorini (Hymenoptera: Braconidae). Proc. Ent. Soc. Wash. 65(4): 306.
>
> ———— and L. M. Walkley. 1951. *in* Muesebeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. Dept. Agr., Agr. Monogr. 2: 90–184.

In shorter articles, references to literature should be included in parentheses in the text.

Tables—Tables are expensive and should be kept to an absolute minimum. In most cases, material in tables can be incorporated into the text. When tables are necessary, each table should be prepared as a line drawing or typed on a separate page with heading at top and footnotes below. Number footnotes consecutively for each table. Use only horizontal rules.

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PROCEEDINGS

of the

ENTOMOLOGICAL SOCIETY of WASHINGTON

U.S. NATIONAL MUSEUM
WASHINGTON, D.C. 20560

PUBLISHED QUARTERLY

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ORGANIZED MARCH 12, 1884

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PROCEEDINGS OF THE

ENTOMOLOGICAL SOCIETY OF WASHINGTON

Vol. 70 DECEMBER 1968 No. 4

NEOTYPE DESIGNATION FOR AEDES (STEGOMYIA) ALBOPICTUS (SKUSE) (DIPTERA: CULICIDAE)[1,2]

YIAU-MIN HUANG, *Southeast Asia Mosquito Project, Department of Entomology, Smithsonian Institution, Washington, D.C. 20560*

Aedes (*Stegomyia*) *albopictus* (Skuse) is one of the most common and widespread species of mosquito throughout Southeast Asia as well as being one of the most important from a standpoint of disease transmission. It belongs to a group of closely related species which are not easily separated and unfortunately erroneous identifications are not infrequent among collections submitted to us. It seems that many of the records of this species which appear in the literature must be accepted with some reservation. It is hoped that the present study of the subgenus being undertaken by the South East Asia Mosquito Project (SEAMP) will in due course help to clarify the situation.

According to Skuse's original description, made from 3 ♀♀, the type of *albopictus* was deposited in the Australian Museum. According to Stone *et al.* (1959), the type was in the School of Public Health and Tropical Medicine, University of Sydney, Sydney, Australia. However, enquiries addressed to these and other museums in Australia and elsewhere have failed to show that any type material is still in existence. In view of this it becomes imperative to designate a neotype for this important species.

In the present paper a detailed description of this neotype is given. In addition, some diagnostic characters for separating *albopictus* from closely related species, which have often been misidentified, are also given in order to assist field workers.

The nomenclature chosen for the chaetotaxy of the pupa and the terminology of structural parts of the adult as used in this paper largely follows that of Belkin (1962).

Aedes (Stegomyia) albopictus (Skuse)
(Figs. 1, 2)

Aedes (*Stegomyia*) *albopictus* (Skuse), 1894, Indian Mus. Notes 3(5):20 (♀; *Culex albopictus* Skuse). Type locality: Calcutta, India.

[1] This work was supported by Research Contract No. DA-49-193-MD-2672 from the U. S. Army Medical Research and Development Command, Office of the Surgeon General.

[2] Immediate publication secured by full payment of page charges—Editor.

Neotype hereby designated: ♂ (No. 1-14-104) with associated pupal skin and terminalia slide (68/1054), Botanical Garden, Calcutta, Bengal, India, 3. VII. 1967. (S. Ramalingam; E. D. Abraham & E. S. Abraham collectors). Deposited in U. S. National Museum.

MALE. *Head.* (Fig. 1A). Proboscis dark scaled, as long as fore femur; palpus longer than proboscis, with a white basal band on each of segments 2–5; those on segments 4, 5 incomplete dorsally; segments 4, 5 subequal, slender, upturned, and with only a few short hairs; antenna plumose, slightly shorter than proboscis; clypeus bare; torus covered with white scales except on dorsal side; decumbent scales of vertex all broad and flat; erect forked scales dark, not numerous, restricted to occiput; vertex with a median stripe of broad white scales, with broad dark scales on each side interrupted by a lateral stripe of broad white scales followed by a patch of white broad scales ventrally. *Thorax.* (Figs. 1A, D). Scutum with narrow dark scales and a prominent median longitudinal stripe of similar white ones, the median stripe narrows slightly posteriorly and forks at beginning of the prescutellar space, there is on each side a posterior dorsocentral white line which does not reach to the middle of the scutum; a patch of broad flat white scales on the lateral margin just before the level of the wing root and few narrow curved white scales over the wing root; acrostichal bristles absent; dorsocentral bristles present; scutellum with broad white scales on all lobes and with a few broad dark ones at the apex of mid lobe; anterior pronotum (*apn*) with broad white scales; posterior pronotum (*ppn*) with broad white scales and some dark narrow ones dorsally; paratergite with broad white scales; postspiracular (*psp*) area without scales; patches of broad white scales on propleuron (*ppl*), on the subspiracular (*ssp*) area, on the upper and lower portions of sternopleuron (*stp*) and on the upper and lower portions of mesepimeron (*mep*); mesepimeron (*mep*) scale patches connected forming a V-shaped white scale patch, the open side of the V directed backwards; lower mesepimeron (*mep*) without bristle; metameron bare. *Wing.* (Fig. 1A). Wing with dark scales on all veins except for a minute basal spot of white scales on the costa. *Haltere* with dark scales. *Legs.* (Fig. 1E). Coxae with patches of white scales; knee-spots present on all femora; fore and mid femora dark anteriorly; paler posteriorly; hind femur anteriorly with a broad white longitudinal stripe which widens at base and is narrowly separated from the apical white scale patch; fore and mid tibiae dark anteriorly, paler posteriorly; hind tibiae dark; fore and mid tarsi with basal white bands on segments 1–2; hind tarsus with basal white bands on segments 1–4, segment 5 all white; fore and mid legs with tarsal claws unequal, the larger one toothed, the smaller one simple; hind leg with tarsal claws equal, simple. *Abdomen.* (Figs. 1A, B). Abdominal segment I with white scales on laterotergite; terga III–VI each with a basal transverse white band which widens laterally; with lateral white spots; the lateral spots not connected with the basal transverse bands; terga II, VII with lateral white spots only; sternum VIII largely covered with white scales (the description was made before the terminalia were re-

→

Fig. 1, *Aedes* (*Stegomyia*) *albopictus* (Skuse). A, dorsal aspect of the neotype male; B, lateral aspect of the neotype male abdomen; C, lateral aspect of the neoallotype female head; D, lateral aspect of the neotype male thorax; E, anterior surface of the neotype male legs.

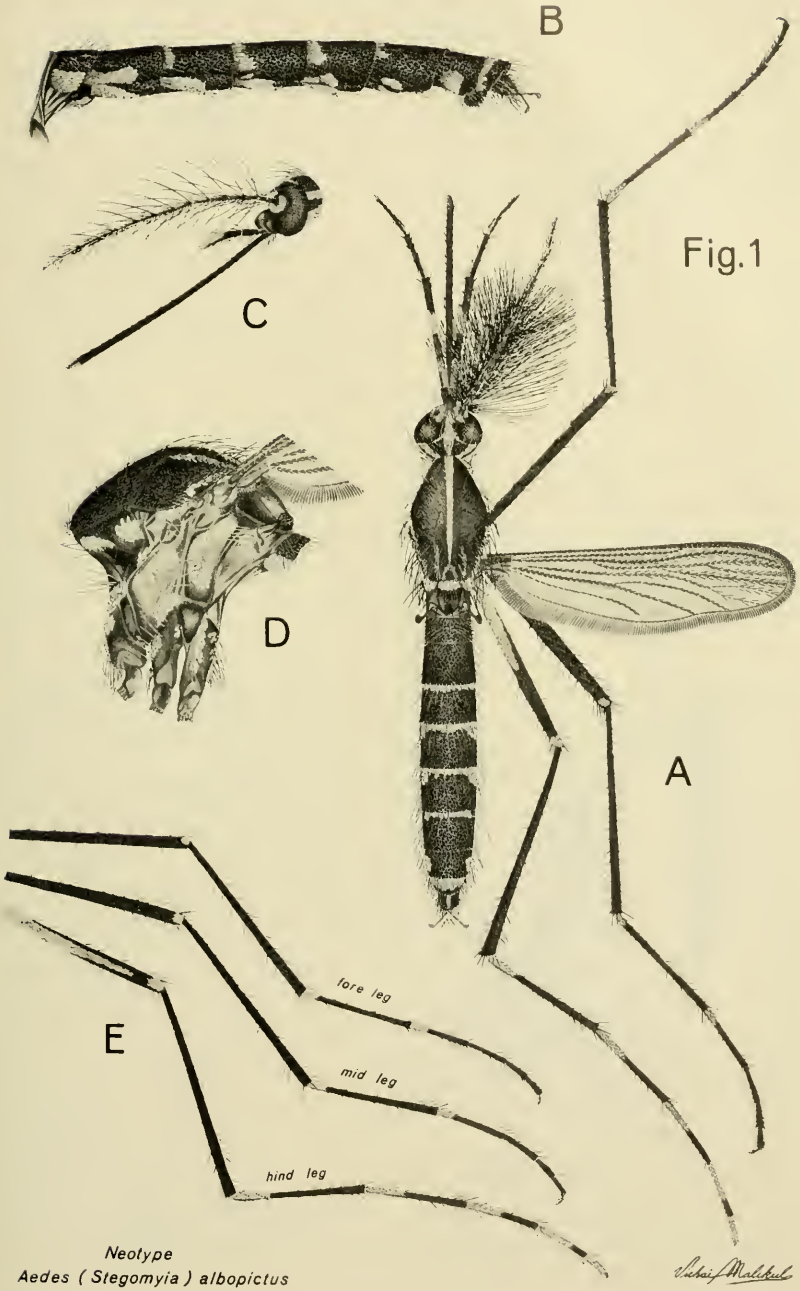

Fig.1

Neotype
Aedes (Stegomyia) albopictus

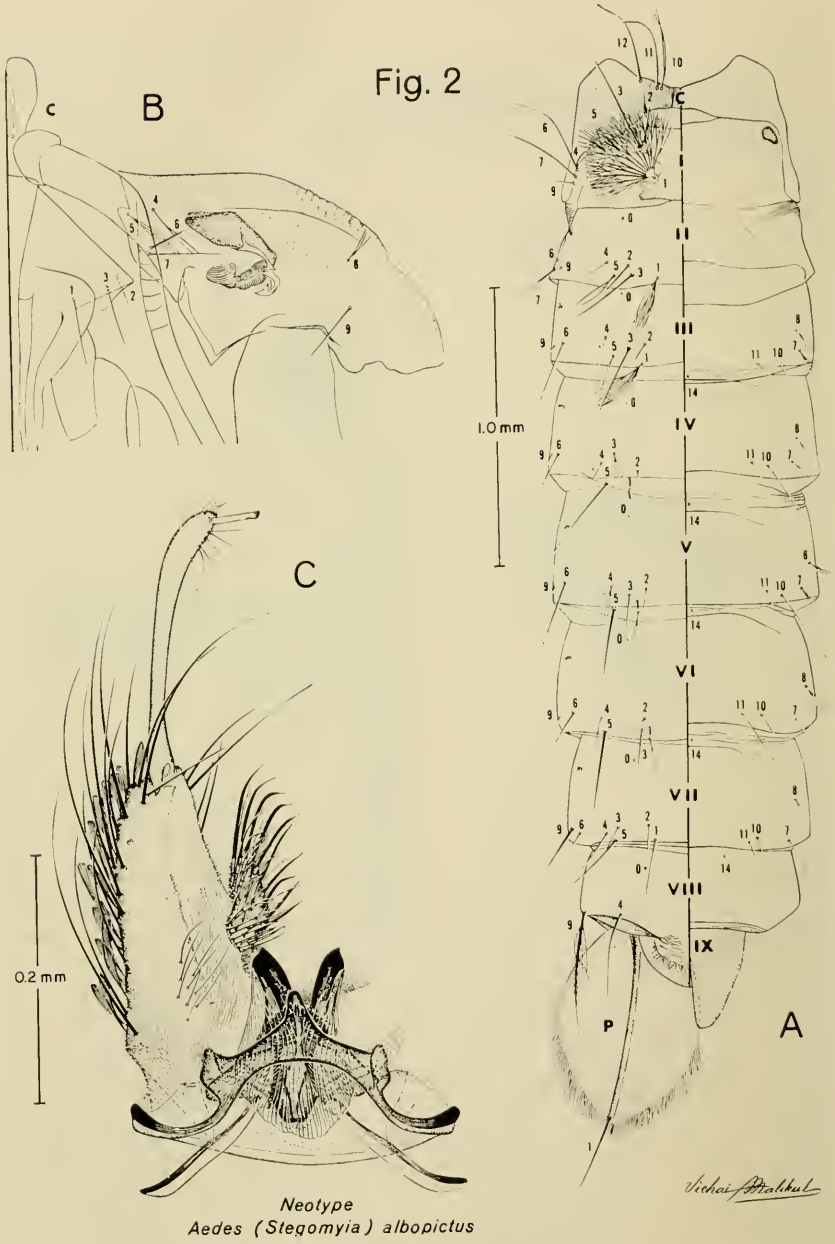

Fig. 2, *Aedes* (*Stegomyia*) *albopictus* (Skuse). A, B, dorsoventral aspects of the neotype male pupa; C, tergal aspect of the neotype male terminalia.

moved). *Terminalia.* (Fig. 2C). Basimere relatively short and broad, 2 times as long as wide; its scales restricted to dorsolateral, lateral and ventral areas; with a patch of 9 hairs on the basomesal area of dorsal surface; mesal surface extensively membranous; claspette large, mushroom-like, with numerous setae and with several widened specialized curved setae on the expanded distal part; distimere simple, elongate, apex somewhat swollen and with some hairs; with a spiniform process at apex; aedeagus with distinct lateral sclerotized plates; with several teeth on each side; paraprocts without teeth; cercal setae absent; ninth tergum with a conspicuous horn-like median projection and with two hairy lateral lobes.

Neo-Allotype: ♀ (No. 1-14-15) with same data as neotype male. Deposited in U.S. National Museum.

FEMALE. (Fig. 1C). Essentially as in the male. Differs from the male in the following respects: Palpus ⅓ of proboscis, with white scales on apical half. Fore and mid-legs with tarsal claws equal, simple. Abdominal basal bands on terga II–VII; segment VIII largely retracted.

PUPA. (Figs. 2A, B). Chaetotaxy as shown in figure which was drawn from the skin of the neotype male. Hair 2-I and 3-I not widely separated, the distance between them as the distance between 4-I and 5-I; hair 1-II branched; hair 2-II laterad of hair 3-II; hairs 3-II and 3-III simple, shorter than segment III; hairs 5-IV, 5-V and 5-VI simple, not reaching beyond the posterior margin of the following segment; hair 9-VIII single, barbed; paddle margins with fringe; hair 1-P single.

TAXONOMIC DISCUSSION. The male terminalia of this species having the IXth tergum with a conspicuous horn-like median projection differs from all other species that have been described in this subgenus. The external diagnostic characters for separating *Aedes* (*Stegomyia*) *albopictus* (Skuse) from *A.* (S.) *pseudalbopictus* Borel, *A.* (S.) *scutellaris* (Walker) and *A.* (S.) *aegypti* (Linnaeus) are as follows.

A. albopictus (male and female) can be distinguished from *A. pseudalbopictus* (male and female) by the presence of a patch of broad flat white scales on the lateral margin of the scutum just before the level of wing root; *pseudalbopictus* has only narrow curved white scales in this position.

A. albopictus (male and female) can be distinguished from *A. scutellaris* (male and female) by the abdominal lateral white spots which are not connected with the abdominal basal white bands and by having the supraalar white line not clearly defined and with only narrow scales posteriorly; in *scutellaris* the abdominal lateral white spots are connected with the tergal bands; the supraalar white line is complete, extending over the wing root towards the scutellum and with broad scales posteriorly.

When scutal markings were rubbed off, *A. aegypti* has been misidentified as *albopictus.* It can be distinguished by having the two

mesepimeral scale patches separated whereas they are connected in *albopictus*.

Acknowledgments

I wish to express my sincere appreciation to Dr. Alan Stone and Dr. Botha de Meillon for the helpful assistance and valuable suggestions regarding this paper and also for a critical review of the manuscript. I also extend my thanks to Mr. Vichai Malikul for his help in making the drawings.

To Dr. D. J. Lee (School of Public Health and Tropical Medicine, University of Sydney, Sydney, Australia); Dr. E. N. Marks (University of Queensland, Brisbane, Australia); Mr. C. N. Smithers (Australian Museum, Sydney, Australia); Drs. A. N. T. Joseph and G. Ramakrishna (Zoological Survey of India, Indian Museum, Calcutta, India); Dr. P. F. Mattingly (British Museum (Natural History), London, England) who had kindly participated in searching for the type material of *albopictus*, I wish to express my gratitude.

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A NEW SYNONYMY IN HYBOMITRA
(Diptera: Tabanidae)

A comparison of 178 specimens of *Hybomitra metabola* (McDunnough, 1922, Canad. Ent. 54:239) from North America with 18 specimens of *H. lurida* (Fallen, 1817, Tabanii et Xylophagii Sveciae:5) from Europe shows such close agreement that the use of the latter name for the species in America seems necessary. McDunnough described *Tabanus metabolus* from Alberta, and we have seen specimens from Alaska, Yukon Territory, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Labrador, Newfoundland, Montana, Wyoming, Colorado, Minnesota, Wisconsin, New York, New Hampshire, and Maine. *Tabanus luridus* was described from "Scania," and the specimens we examined came from Germany, Scotland, Denmark, Finland, Sweden, "Lappland," and western U.S.S.R. Both sexes were represented from both faunal regions.—L. L. Pechuman, *Cornell University, Ithaca, New York 14850*, and Alan Stone, *Systematic Entomology Laboratory, Entomology Research Division, ARS, USDA, c/o U.S. National Museum, Washington, D. C. 20560.*

COLONIAL BEHAVIOR OF APIS MELLIFERA MELLIFERA L. AFTER EXPOSURE TO GAMMA RADIATION[1]

(HYMENOPTERA: APIDAE)

ROBERT B. BROOKS, JR. and JAMES J. BRENDLE, *Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C. 20012*

Few studies have been conducted on the effects of radiation in insect behavior. Except for the tunneling behavior of ants during (Brower, 1966) and after radiation (Krebs, 1966), the colonial insects have received little attention. We chose to study radiation effects on the colonial behavior of the honeybee, *Apis mellifera*, because its normal behavior is well documented (Von Frisch, 1966; Ribbands, 1964) and its domestication makes handling easier than that of other social insects. This is a preliminary study and not a quantitative assessment of observed variations from normal behavior.

The honeybees were obtained from the Apiculture Laboratory, Department of Entomology at the University of Maryland, College Park, and the University of California at Davis. Approximately equal numbers of bees were placed in standard observation hives (A. I. Root & Co., Medina, Ohio) equipped with sides of Lucite® plastic which were covered with fiberboard when the bees were not being observed or irradiated. The hives were then placed in a fixed location in the apiary and observed for a period of one month to establish normal hive behavior in this environment.

The night before irradiation both the experimental and control hives were closed and removed to an air conditioned room at 21°C to minimize excitement and subsequent overheating caused by confinement of the bees to the hive. The hives were maintained at this temperature until after irradiation on the following morning, when they were returned to their original locations in the apiary and the bees released. The total period of confinement never exceeded 18 hours.

The gamma radiation source was a Cobalt-60 small animal irradiator (Budd Instrument Co., Coatsville, Pennsylvania) which gave a dose rate of approximately 52 rads/min. (table 1) to both sides of the hive. Each exposure of the source results in a transit dose of 2.2 rads which was included in the total dosage. Dosimetry using lithium fluoride detectors distributed bilaterally across the comb indicated that the dose rate did not vary more than ± 1.8 rads/min. at comb level. Although insignificant amounts of ozone were produced, the irradiation chamber was opened every two hours for a period of one minute to allow for ventilation.

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[1] Immediate publication secured by full payment of page charges—Editor.

Colonial behavior is dependent on the efficient functioning of the hive as a honey producing unit. Normal cyclic behavior is characterized by an unvarying group of activities carried out by the bees. We studied the most obvious changes in hive behavior occurring after irradiation. Activity in colonies which received doses of 500 to 1,000 rads remained comparatively normal after irradiation. Hives which received dosages above 2,000 rads immediately showed a marked excitement which lasted from one to three hours. This excitement was characterized by the majority of the bees moving rapidly in a circular path on the comb. Above 2,000 rads there appeared to be no dose response relationship between dosages received and the length of the period of excitement. Activity then decreased to a point where the majority of the bees remained calm and faced upwards on the comb; this lethargic state contributed to the inability of the hive to function as a colony and persisted until the hive died out. At dosages above 8,000 rads the bees made no attempt to sting even when excessively handled, thus providing little protection for the colony.

On the day following exposure to radiation only the non-irradiated control colony exhibited any flight activity, but by the second day some normal flight activity was observed in all colonies. At all dosages very few of the bees were flying as compared to pre-radiation flight under similar weather conditions. The hives receiving 500 and 1,000 rads exhibited greater flight activity than those hives receiving dosages above 2,000 rads, although flight was still much reduced when compared to the control colony. The decreased flight activity may have been due to the fact that many of the bees had difficulty in orienting themselves when attempting to fly (Engel, 1967). It was observed that many of these bees fell over or staggered after landing at the hive entrance. After irradiation the normal flight sound was noticeably changed. Instead of the normal smooth buzzing of the bee in flight the sound became erratic with apparent frequency variations.

Since the queens' laying ability has significant influence on colonial survival, they were closely observed both before and after irradiation. All queens were laying normally before exposure but following irradiation at all dosages egg production ceased. When an 8,000 rad colony was removed from the irradiation chamber the queen was observed attempting unsuccessfully to lay eggs. As usual the queen would examine each cell, then attempted to deposit an egg. She remained with her abdomen in a single cell for an abnormal length of time, up to four minutes in most cases. Close examination revealed that these cells did not contain eggs. The queens in hives receiving 500 and 1,000 rad dosages regained their egg laying ability, but this did not occur for from six to eight weeks after irradiation. These eggs were viable fertilized eggs which developed into normal worker bees.

A queen with clipped wings which received a 1,000 rad dosage was

Table 1. Total hive dosages.

Total Dosage Given (Rads)	Exposure Time (Min)	Exposure Rate (Rads/Min)	Transit Dose (Rads)
500	9.5	52.5 ± 1.8	2.2
500	9.9	51.6 ± 1.8	2.2
1,000	19.0	52.5 ± 1.8	2.2
1,000	19.7	51.6 ± 1.8	2.2
2,000	38.0	52.5 ± 1.8	2.2
2,000	38.5	51.6 ± 1.8	2.2
4,000	76.2	52.5 ± 1.8	8.8
4,000	77.2	51.6 ± 1.8	8.8
8,000	152.4	52.5 ± 1.8	8.8
8,000	151.4	52.8 ± 1.8	8.8
16,000	305.4	52.5 ± 1.8	13.2
16,000	309.5	51.6 ± 1.8	13.2
16,000	302.5	52.8 ± 1.8	13.2

dissected a week after she regained her egg laying ability. Except for a few brownish spots on the posterior dorsal surface, the ovarian tubules appeared normal upon gross examination (Snodgrass, 1956; Erdman, 1961). Viable sperm were observed in the spermatheca.

Swarming occurred 12 to 14 days after irradiation in hives receiving more than 1,000 rads; this may have been due to a lack of food or a direct effect of radiation. The bees and queens were unexpectedly missing from their colonies. In one case a swarm was located in a nearby tree. Swarming due to radiation may result from the inability of the adult bees to cope with the overwhelming number of deaths in the juvenile stages. Similar type swarming from colonies receiving heavy doses of insecticides has been reported (Eckert, 1963).

In cases where swarming did not occur the queens in colonies receiving dosages from 1,000 rads were missing from their colonies within 12 to 14 days. Even though viable brood was present in the queenless colonies the remaining bees did not attempt to build queen cells. The colony then gradually dwindled until it ceased to function as a unit.

Brood mortality in the honeybee followed the patterns of radiation death observed in other insects (Benschoter, 1964; Ducoff, 1966; Lassota, 1963). Brood mortality was dependent on the stage of development at the time of irradiation. The only appreciable increase in adult deaths was observed at the 16,000 rad dose. It is not clear, however, whether this was caused by radiation or poor ventilation, since it occurred in only two of the three hives irradiated at this dose. Hives receiving more than 1,000 rads had a 100% mortality in eggs and larval stages. The percentage of pupal deaths varied at the

lower dosages but increased proportionately to the dose at the three highest levels of irradiation. Even during irradiation the bees removed capped pupae from their cells and continued to do so until the colony died. Cannibalism of the removed capped pupae was observed at dosages of 4,000, 8,000 and 16,000 rads.

Twenty-four hours after irradiation no eggs or larvae could be found in any of the cells regardless of dosage received. Since no eggs or larvae were observed on the bottom board or outside of the hive, and no appreciable flight occurred, cannibalism was suspected (Wixson, 1967). The only observed deformities in the brood that emerged as adults were deformed wings and a darker than normal pigmentation.

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NEW SPECIES OF MITES FROM PINE

(ACARINA: TARSOCHELIDAE, EUPALOPSELLIDAE, CALIGONELLIDAE, CRYPTOGNATHIDAE, RAPHIGNATHIDAE, and NEOPHYLLOBIIDAE)

ROBERT L. SMILEY[1] and JOHN C. MOSER[2]

The purpose of this paper is to describe several new species of mites, most of which were found in the outer bark of *Pinus taeda* L. at Elizabeth, in central Louisiana. They were discovered in the course of research on the seasonal ecology of *Dendroctonus frontalis* Zimmerman.

Between January 1, 1966, and April 17, 1967, bolts were cut from trees every two weeks at various heights of infestation, and bark beetle galleries examined for mites. When all beetles had emerged (1–6 months after bolts were cut) galleries, loose inner bark, and boring dust were again examined.

Most of the mites studied were apparently not associated with bark beetles, and are probably allied with the outer bark niche. Bark beetles live and feed in the inner bark, which has a completely different fauna. No observations were made on the mites' feeding habits.

TARSOCHELIDAE

Hoplocheylus pickardi, n. sp.

(Figs. 1–2)

The large apophysis on the palpus will separate this species from other known members of the genus.

Female. Palpus with genu incompletely fused with femur; tibiotarsus with 5 simple setae, 1 solenidion, 2 short blunt subterminal spines; proximal spine slightly stronger. Body elongate, broadest in region of metopodosoma. Propodosoma with a dorsal plate bearing a pair of pseudostigmata near the anterolateral margin; 1 pair of pseudostigmatic organs, and 3 pairs of simple setae. Hysterosoma with 4 plates. First plate with a single pair of dorsocentral simple setae; adjacent pair of lateral plates with a pair of simple setae subequal in length to posterior medial propodosomal setae. Second plate wider and longer than the third plate; each plate with a single pair of dorsocentral setae subequal in length. Fourth plate with 2 pairs of dorsocentral setae; anterior pair about one-half length of posterior pair. Fifth plate with a pair of dorsocentral setae, subequal in length to posterior pair of the fourth plate; and with a pair of lateral simple setae. Dorsal anal region terminating with a pair of simple setae, subequal in length to those of the fifth plate. Venter as figured. Legs I longest. Legs II shortest. Legs III slightly longer than legs II, but not as long as legs IV. Solenidion on tibiae I–III. Body including gnathosoma 533 μ long by 133 μ wide.

Male. Not known.

The female holotype, USNM 3252, and a female paratype were taken at Elizabeth, Louisiana from loose inner bark of *Pinus taeda* L., infested with *Dendroctonus frontalis* Zimmerman. The former was

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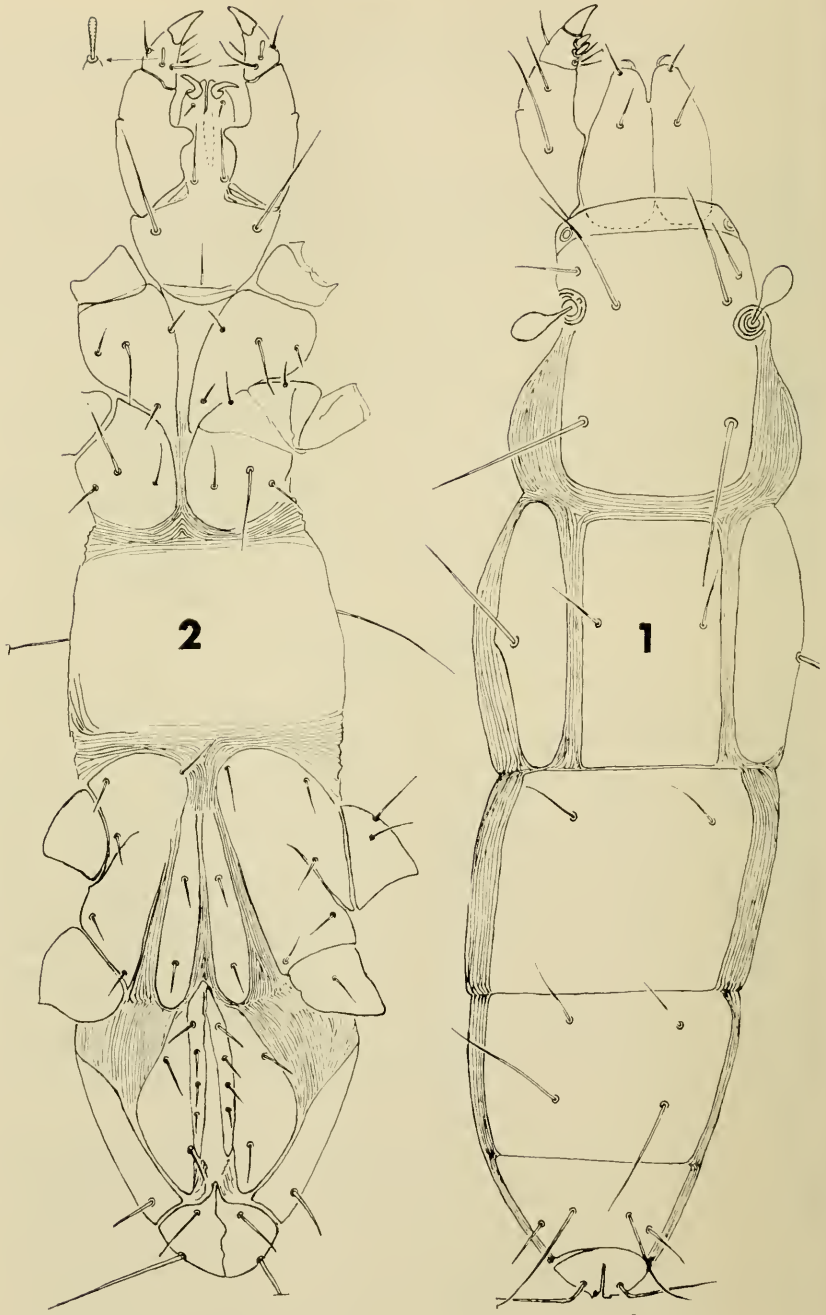


Figs. 1 & 2, *Hoplocheylus pickardi*, n. sp., ♀: 1, dorsum; 2, venter.

collected July 27, 1967 from a bolt cut July 26 at 16 feet. The latter was found August 1 from a bolt cut July 17. *Hoplocheylus pickardi* is named for Lloyd S. Pickard, who has contributed to our knowledge of the relationship of bark beetle attacks to lightning-struck pines.

CALIGONELLIDAE

Molothrognathus rosei, n. sp.
(Figs. 3–5)

This species keys out to *Molothrognathus leptostylus* Summers and Schlinger but differs by having slender dorsal setae, stronger peritremal segments, and dorsal genitalia.

Female. Stylophore tapered roundly, cleft anteriorly at mid-line to movable digit which is short and stout; fixed digit shorter and stronger than movable digit. Peritreme strong, with 4 pairs of segments. Palpus robust and about twice the length of rostrum. Idiosoma slender, widest in the region of the propodosoma; with 11 pairs of simple dorsal setae (excluding those of the genitalia) subequal in length; with 3 pairs of integumental pores, first pair directly behind the eyes, second pair arising over coxae IV, and third pair laterad to the genitalia. Genitalia with 3 pairs of setae, anterior pair two-thirds the length of medial and terminal pair. Venter as figured. Legs slender; legs I longest, legs II shortest, and legs III and IV subequal in length. Body 363 μ long and 166 μ wide.

Male. Not known.

The female holotype, USNM 3253, was taken from a vial of alcohol containing numerous adults of *Dendroctonus frontalis* Zimmerman and *Ips bonanseai* (Hopk.) from *Pinus leiophylla* Shaw and *P. montezuma* Lamb which were collected by Dr. W. E. Rose from August to December 1964, near Puebla, Mexico.

Molothrognathus rosei is named for Dr. W. E. Rose, who has contributed to our knowledge of pine bark beetles in Mexico.

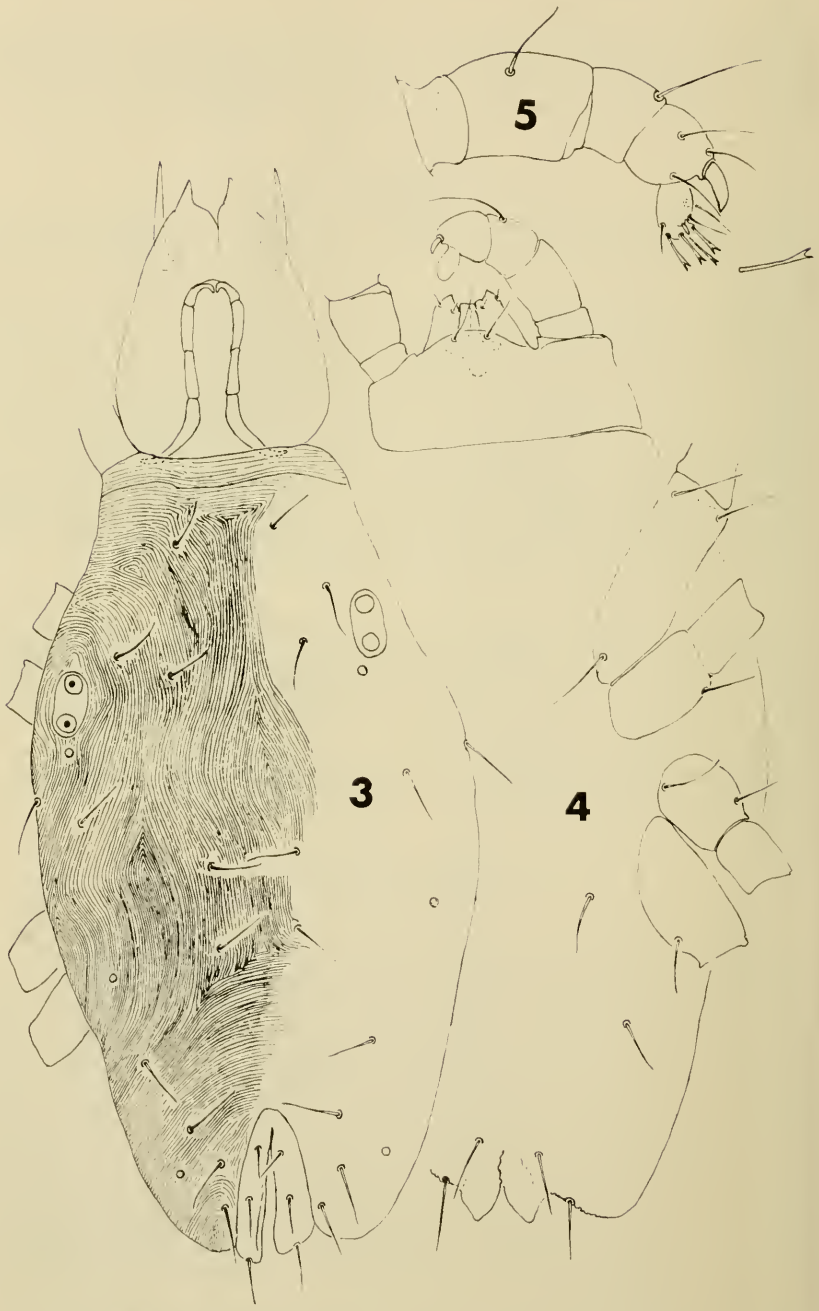
NEOPHYLLOBIIDAE

Neophyllobius lorioi, n. sp.
(Figs. 6–7)

Neophyllobius lorioi keys out to *N. quadrisetosus* De Leon but differs from this species by having long subequal spinose whiplike setae on all four genu.

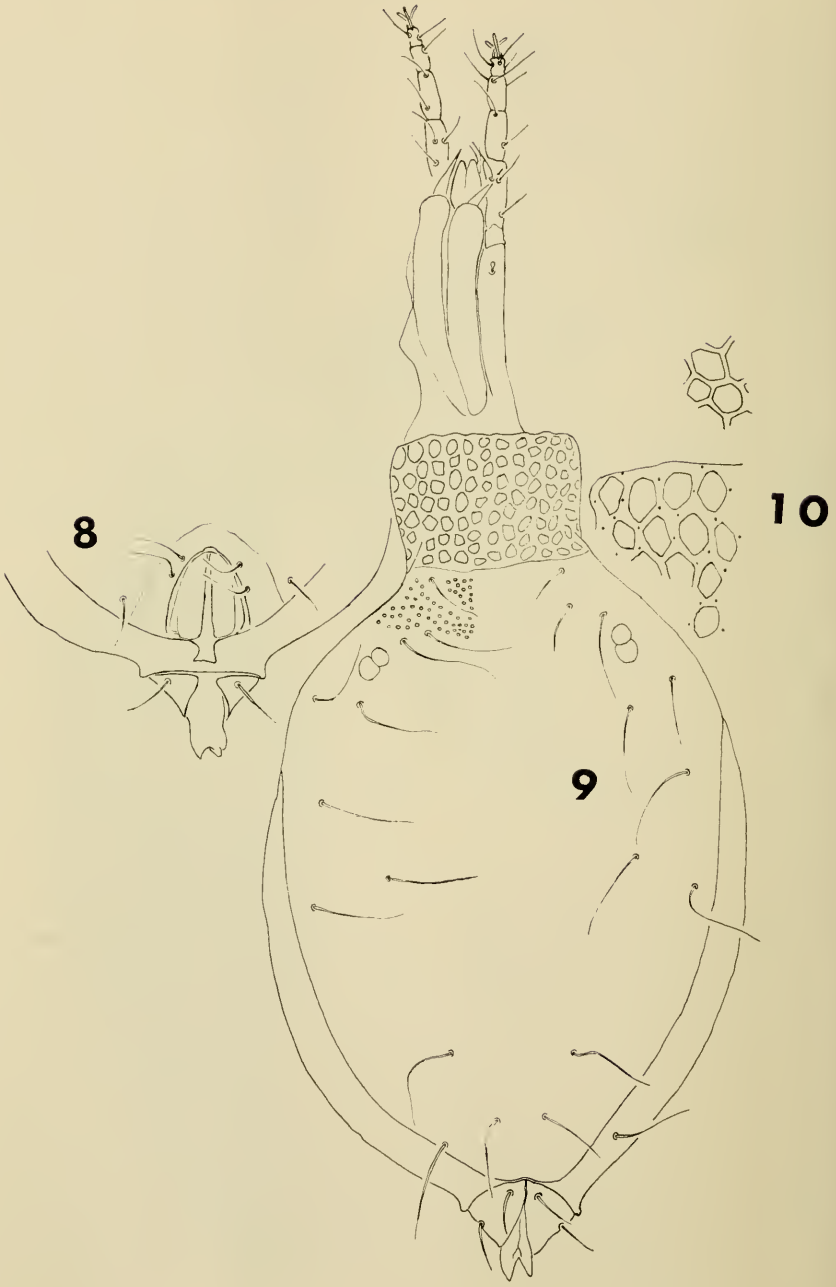
Female. Gnathosoma slightly oval; peritreme composed of 5 segments. Palpus long and slender; palpus femur without setae; genu with 2 spinose setae; tibia with 1 simple seta; tarsus with 4 simple setae, 1 spinose seta and terminating with 2 solenidia. Dorsum with 15 pairs of spinose saberlike setae, those on the distal margin of the body shortest. Striae of dorsum as figured. Legs I longest; femur 159 μ long. Legs II not as long as legs III; femur 127 μ long. Legs III longer than legs IV; femur 127 μ long. Legs IV shortest; femur 153 μ long. Tarsus I and II each with a short solenidion; setae spinose proximally and finely serrate distally. Tarsus III and IV each without solenidion. Setae on these appendages same as those on tarsus I and II. Tibia III and IV each with a long solenidion. Anal region with 3 pairs of simple setae and genitalia with 2 pairs. Body 366 μ long and 223 μ wide.

Male. Not known.



Figs. 3–5, *Molothrognathus kilei*, n. sp., ♀: 3, dorsum; 4, venter; 5, left palpus.

Figs. 6 & 7, *Neophyllobius lorioi*, n. sp., ♀: 6, dorsum; 7, left leg I.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The female holotype, USNM 3254, was taken from the outer bark of a six-inch diameter breast high *Pinus taeda* L. February 17, 1966 near Pineville, Louisiana. No bark beetles were found on or in the tree. Two paratypes were collected near Elizabeth, Louisiana from bolts cut at a 32 foot height from *P. taeda* L. infested with *Dendroctonus frontalis* Zimmerman and *Ips* spp. One was found under loose inner bark April 20, 1966 of a tree cut April 19; the other was found in beetle boring dust June 1, 1966 from a tree cut May 2.

Neophyllobius lorioi is named for Dr. Peter L. Lorio, Jr., who has added greatly to the information concerning attacks by pine bark beetles in relation to soil type.

CRYPTOGNATHIDAE

Cryptognathus barrasi, n. sp.
(Figs. 8–10)

This species according to Summers and Chaudhri (1965) belongs to the Favus Group and keys out to *Cryptognathus ochraceus* Summers and Chaudhri. This new species is distinctive in having more slender dorsal setae and fewer dimplelike depressions on the prosternal apron.

Female. Hood wider than long; with as many as 7–8 dimples per longitudinal row. Dimples hexagon shaped; a pore adjacent to each angle of the dimple. Chelicerae fused together proximally. Dorsum with 11 pairs of smooth and slender setae (excluding those of the genital covers), subequal in length except for the anterior pair which are shorter; striae fine but visible, and longitudinal; punctation small and densely scattered. Ventral plating with punctation and striae spaced and similar to dorsum. Genital and anal region as figured. Legs I and IV longest and subequal in length; legs II and III shortest and subequal. Body excluding gnathosoma 300 μ long by 236 μ wide.

Male. Not known.

The female holotype, USNM 3255, and three paratypes were all collected from underside of bark scales of the same tree as that of *Neophyllobius lorioi*, and were not associated with bark beetles. Two more paratypes were collected at Elizabeth, Louisiana from *Pinus taeda* attacked by bark beetles. One was found November 9, 1965 under bark scales on a bolt infested with *Ips avulsus* (Eichh.) and *I. grandicollis* (Eichh.) cut September 29. The other was collected July 12, 1965 from under loose inner bark of a bolt cut May 30 at a height of 32 feet and infested with *Dendroctonus frontalis* Zimmerman and *Cerambycidae* spp. *Cryptognathus barrasi* is heavily sclerotized and dark red in nature.

The mite is named for Dr. Stanley J. Barras, who has added greatly to our knowledge of the relationship between pine bark bettles and the fungi carried in their mycangia.

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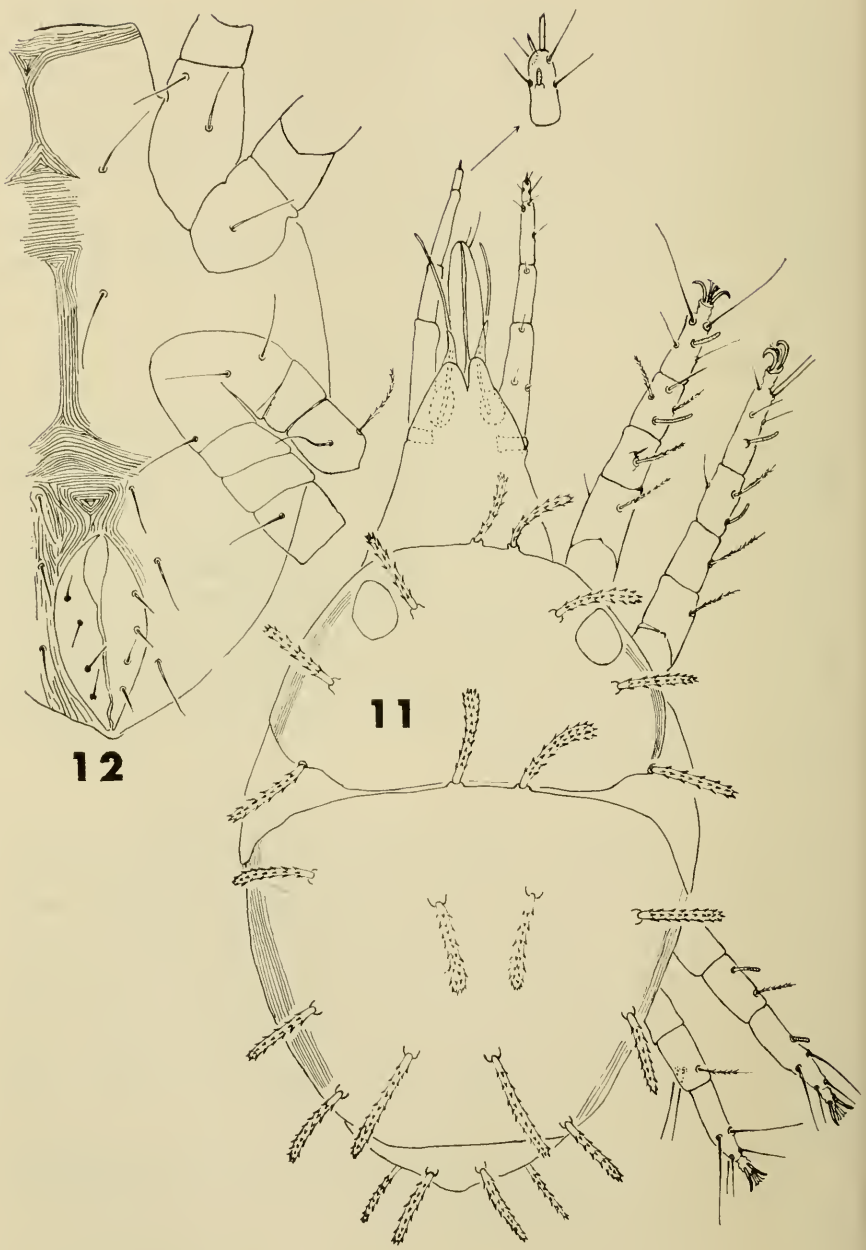
Figs. 8–10, *Cryptognathus barrasi*, n. sp., ♀: 8, venter, genital and anal region; 9, dorsum; 10, dimplelike depressions of rostrum and prosternal apron.



Figs. 11 & 12, *Paraeupalopsellus hodgesi*, n. sp., ♀: 11, dorsum; 12, venter.

EUPALOPSELLIDAE

Paraeupalopsellus, n. gen.

Dorsal idiosoma with 2 distinct dorsal shields, anterior and posterior shields with 5 pairs of stout, denticulate setae originating on tubercles. A single pair of large lenslike eyes. Palpal-tarsus less than one-fourth the length of other palpal segments. Summers (1960) clarified the status of Eupalopsellidae.

Type species. Paraeupalopsellus hodgesi, n. sp.

Paraeupalopsellus hodgesi, n. sp.

(Figs. 11–12)

This species may be recognized by the short palpal-tarsus and the two large dorsal shields.

Female. Gnathosoma tapering, long and slender. Chelicerae needlelike, long and slender, with fixed movable digits set close together proximally. Palp-tarsus short, less than one-fourth the length of other palpal segments. Dorsum with 11 pairs of stout, denticulate setae originating on tubercles; with 2 dorsal shields; and with a single, large pair of lenslike eyes. Idiosoma oval, broadest at suture separating the propodosoma and hysterosoma. Venter as figured. Legs I longest, legs II longer than legs III and IV; legs III and IV subequal in length. Tibiae and tarsi I, II and III each with a strong solenidion. Only genu I with a duplex setae complex. Body excluding gnathosoma 262 μ long by 178 μ wide.

Male. Not known.

The female holotype, USNM 3256, was found at Elizabeth, Louisiana from under loose inner bark of *Pinus taeda* L. bolt April 4, 1966. This bolt was cut on April 4, at the height of 32 feet and was infested with *Dendroctonus frontalis* Zimmerman, *Ips avulsus* (Eichh.) and *I. calligraphus* (Germ.). The mite was slow moving and reddish-pink in color. *Paraeupallopsellus hodgesi* is named for Dr. John D. Hodges, who has added to our knowledge concerning the success of pine bark beetle attack in relation to food content of trees.

RAPHIGNATHIDAE

Neoraphignathus, n. gen.

Dorsal idiosoma without plates or shields; striae irregular, longitudinally on propodosoma and transversely on hysterosoma; with 11 pairs of setae (excluding the anogenital region); 1 pair of eyes situated centrally above coxae I and II. Coxae I–IV approximate. Cheliceral bases fused forming a conical stylophore. Peritreme terminating at anterolateral margin of propodosoma.

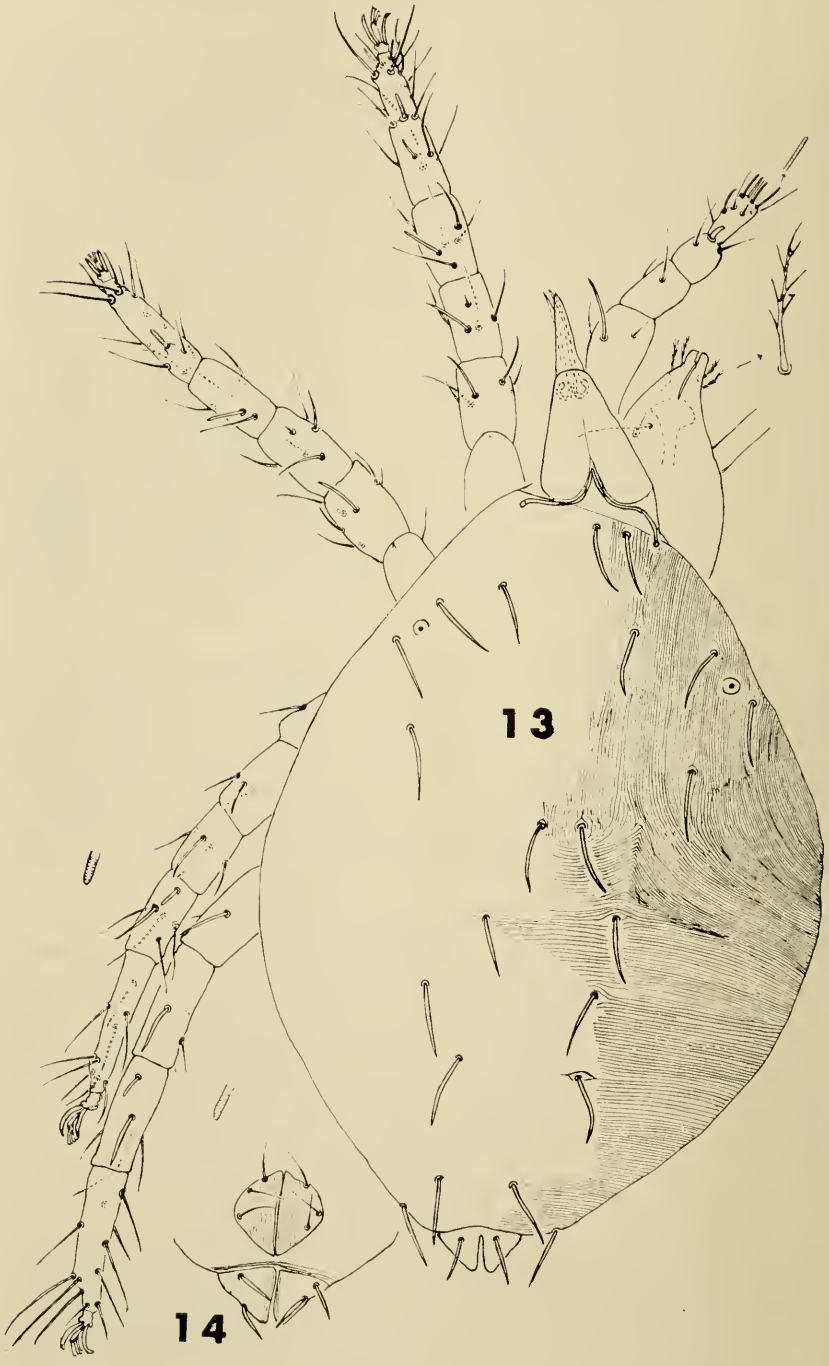
Type species. Neoraphignathus howei, n. sp.

Neoraphignathus howei, n. sp.

(Figs. 13–14)

Atyeo, Baker, and Crossley (1961) referred only one genus to the family Raphignathidae. This new genus differs in not having dorsal shields.

Female. Gnathosoma conical distally. Cheliceral bases fused, forming a conical stylophore. Peritreme terminating at anterolateral margin of propodosoma.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Palpus stout and strong; tarsus distally with 4 subequal solenidia, and laterally with a single solenidion and 4 subequal simple setae; tibia with a strong thumb claw and 2 subequal simple setae; genu with 2 subequal simple seta. Venter of rostrum as figured. Dorsum without plates or shields but with irregular striae; striae longitudinal on propodosoma and transverse on hysterosoma; with 11 pairs of subequal saberlike setae; a pair of lateral eyes located above coxae I and II. Anal region ventrally with 2 pairs of saberlike setae and dorsally with a single pair. Genitalia with 3 pairs of simple subequal setae. Legs I and II subequal in length; legs III slightly longer, but not as long as legs IV. Setae for all legs as figured. Body excluding gnathosoma 280 μ long by 217 μ wide.

Male. Not known.

The female holotype, USNM 3257, was taken at Elizabeth, Louisiana from loose inner bark bolt cut December 30, 1964 of *Pinus taeda* L. The bolt was infested with *Dendroctonus frontalis* Zimmerman and *Ips* spp.

Neoraphignathus howei is named for Dr. Virgil K. Howe, who has greatly contributed to our knowledge of the microflora of pines attacked by bark beetles.

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Figs. 13 & 14, *Neoraphignathus howei*, n. sp., ♀: 13, dorsum; 14, genital and anal region.

ONE PREVIOUSLY DESCRIBED AND ONE NEW SPECIES OF SOUTH AMERICAN BRUCHIDAE INJURIOUS TO COMMERCIAL LEGUME SEED CROPS

(COLEOPTERA)

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In the collections of the U.S. National Museum are specimens of two species of South American Bruchidae which have been reared from seeds of clover (*Trifolium pratense* L.) and seeds of alfalfa (*Medicago sativa* L.). The species in clover is from Chile and has been identified by comparing it with type specimens of *Bruchus* (s. l.) *pyrrhomelas* Philippi; the one reared from alfalfa from Peru and Bolivia is apparently new and is described herein.

These two species are remarkable in that they are clearly related to groups of species peculiar to the New World but as far as known do not relate closely to Old World species of *Bruchidius* (s. l.) infesting *Trifolium* spp. or *Medicago* spp. The New World species have obviously moved from their yet unknown native hosts into the introduced legumes.

Sennius willei, n. sp.

Bruchidius n. sp., Wille, 1943, p. 358.

Length: 1.25–1.50 mm. *Width*: 0.75–1.0 mm. *Color*: Integument black, front and middle legs red, occasionally dusky at base of femur; hind femur piceous in basal two-thirds, apex red, tibia and tarsal segments red; antenna with segments 1–4 (occasionally 5 also) red, 6–11 piceous; labrum red-brown; vestiture of ochreus or brown and gray slender setae in vague fasciate pattern on elytra (fig. 1), faintly striped on pronotal disk; venter with gray setae evenly distributed but denser on metepisternum and lateral margins of abdomen; pygidium with wedge-shaped median condensation of setae.

Head broad; eyes prominent; ocular sinus three-fourths length of eye, densely setose; postocular lobe with narrow fringe of setae; frons densely, strigosely punctate, punctures setiferous; frontal carina faint, ending in obscure dorsal boss; fronto-clypeal suture prominent, fringed with setiferous punctures; setae overlying clypeus; clypeus with punctation similar to that of frons; labrum semicircular, impunctate, with 2 setae on either side near apical margin, fringe of short setae on apical margin; palpi black; antenna short, setose, reaching posterior angle of pronotum, segments 1–4 clavate, 5–10 slightly eccentric (fig. 5), ovate in cross-section, 11 oviform with apical spine. *Pronotum* campaniform (fig. 1), length to width ratio 11 : 9, lateral margins slightly arcuate, anterior margin rounded, basal margin truncate laterally, prescutellar lobe prominent, emarginate; pronotal disk punctulate, with scattered, ovate, setiferous foveae; lateral carina of disk obsolete; prosternum triangular, carinate between apically contiguous coxae.

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Elytra subquadrate, separately rounded apically, together slightly longer than wide (8.8 : 8.0); striae not distorted laterally at base, deeply impressed, setiferous strial punctures scarcely visible; first stria ending basally at apex of scutellum, second ending basally in a small, deep pit, third, fourth and fifth variable at base, sometimes ending in simple denticles, sometimes with denticles placed on narrow, flat ridge parallel to basal margin, remaining striae as in fig. 1; intervals transversely, finely rugulose; bead of sutural margin fine, continuous with serrate bead of apical margin. *Hind femur* short, length to width ratio 4 : 1.5, not carinate beneath, with single, fine denticle near apex on inner ventral margin (fig. 4). *Hind tibia* short, stout, straight, carinate on lateral face, ventral carina lacking; apical margin with 3 teeth subequal in length to mucro (fig. 4); basitarsus strongly curved, carinate, subequal in length to remainder of tarsal segments combined. *Pygidium* of male bent under slightly at apex and fitting into slight emargination on last sternite. *Male genitalia* (figs. 2 & 3) with ventral valve triangular, setiferous; hinge sclerites boat shaped, hollow; internal sac trilobed, densely armed with fine spicules; gonopore valve sclerite circular. Lateral lobes (fig. 3) deeply divided, setiferous.

Holotype ♂, PERU: Omas, 60 mi SE Lima, Mar. 1, 1935, J. Wille, coll., #10-35, in alfalfa seed. USNM 69941.

Paratypes, 12 ♂, 14 ♀, same data as holotype. PERU: Ancash, Feb. 10, 1934, J. M. Lamas, coll., #2-34, in alfalfa seed, 7 ♂, 10 ♀; Lima, Apr. 29, 1958, H. R. Yust, coll., 1 ♂. BOLIVIA: LaPaz, Dec. 1945, R. Perez, coll., in alfalfa seed, 3 ♂, 3 ♀.

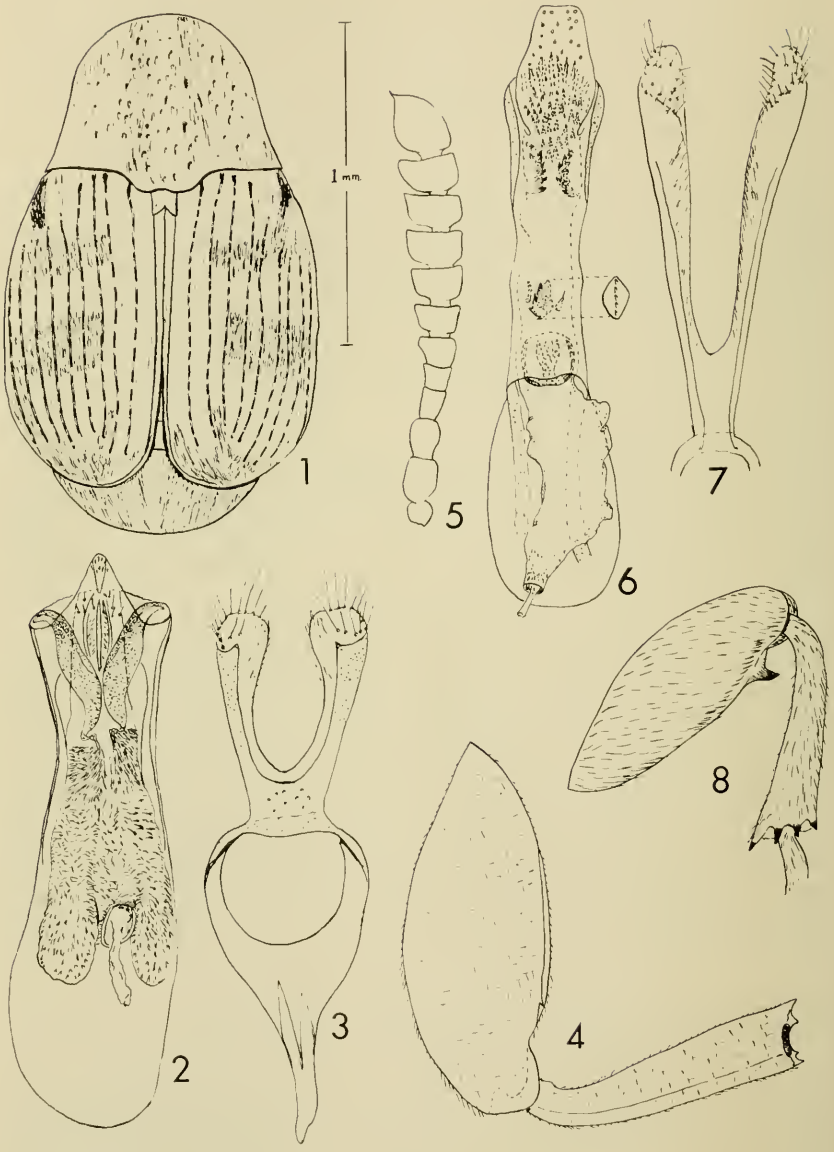
I am placing this species in *Sennius* partly on the basis of external characters and partly on peculiarities in the male genitalia. The generic limits of *Sennius* have yet to be drawn, but in the species I have seen which seem to be congeneric with the type-species, *Sennius cruentatus* (Horn), a characteristic pair of boat-shaped sclerites at the apical orifice in the male genitalia is always present as is a unidentate hind femur and the lack of a lateral carina on the pronotum.

Dr. Wille (1943) listed this species as *Bruchidius* sp. apparently on the authority of the late H. S. Barber, whose identification labels were attached to the specimens in the U.S. National Museum collection. I could find no descriptions of Bruchidae which could apply to this species.

Acanthoscelides pyrrhomelas (Philippi)

Bruchus pyrrhomelas Philippi, 1864, p. 359; Pic, 1913, p. 43.
Acanthoscelides pyrrhomelas: Blackwelder, 1946, p. 761.

Length: 1.3–1.6 mm. *Width*: 0.75–1.0 mm. *Color*: Mature specimens: integument black; hind femur black; hind tibia and tarsus, front and middle legs dark brown to black; antenna black with basal 4 segments reddish beneath. Vestiture of bronzy and gray slender setae nearly evenly distributed over body except for slight condensation along midline of pygidium, dense gray stripe on metepisternum and dorsal margins of abdominal sternites, and dense white patch on scutellum. Teneral specimens: elytra mostly red except for black sutural stripe narrowed apically.



Figs. 1–5, *Sennius willei*, n. sp.: 1, dorsal habitus; 2, median lobe, ventral; 3, tegmen, dorsal; 4, hind leg, mesal face; 5, antenna. Figs. 6–8, *Acanthoscelides pyrrhomelas* (Philippi): 6, median lobe, ventral; 7, lateral lobes, dorsal; 8, hind leg, lateral face.

Head with frons convex, without frontal carina but usually with vague, impunctate median line ending dorsally in shallow, elongate fovea on level with dorsal margin of eye; surface minutely granulose with scattered, shallow depressions each bearing a curved seta; eye prominent, convex, ocular sinus about one-half length of eye, densely setose; clypeus slightly depressed, thinly clothed with golden setae; labrum with transverse basal row of short, fine setae and a transverse row of 4 stouter setae; antennae slender, gradually clavate. *Pronotum* campaniform, wider than long, lateral margins slightly constricted near basolateral angles; prescutellar lobe shallow; disk evenly convex, with short, mesal sulcus near basal margin; punctation scattered, fine, shallow; lateral carina lacking but replaced by obtuse ridge; apex with vertical submarginal sulcus prominent; tubercle at insertion of front coxa prominent, shining; prosternum short, triangular. *Elytra* together as wide as long, lateral margins arcuate, apical margins evenly rounded; striae not distorted, intervals of approximately equal width, striae 3, 4 and occasionally 5 each ending basally in a fine denticle, striae 5 and 6 joining at apical three-fourths, remaining striae free apically. Scutellum short, angulately emarginate apically, densely clothed with white setae. *Front and middle legs* not modified. *Hind femur* (fig. 8) fusiform, not strongly incrassate, ventral carinae obsolete, inner ventral margin with sharp tooth, without denticles apicad or distad of tooth. *Hind tibia* slender, bent only at base, gradually clavate, slightly flared at extreme apex, terminal margin truncate with three short, dark teeth; mucro slightly longer and more slender than teeth; carinae entirely lacking on inner and outer faces; basitarsus clavate, about one-half as long as tibia. *Abdomen* not modified except apical margin of last sternite emarginate in ♂. *Pygidium* more strongly convex in ♂. *Male genitalia* (figs. 6 & 7) with ventral valve spatulate, truncate, armature of internal sac as figured; lateral lobes deeply cleft, spatulate.

Lectotype ♂ selected from type series kindly loaned to me by Dr. Vicente Perez de Angelo through Dr. Guillermo Kuschel. Specimen originally mounted on broad, white, triangular point, but remounted on narrow, white point. Pin lacking locality labels. Two other paralectotypes on broad points on same pin. Male genitalia of lectotype mounted in glycerin in microvial. Nine paralectotypes total are in the type-series. Type-locality from original description: Santiago, Chile.

Additional records: CHILE: Santiago, M. J. Riviera, in *Trifolium pratense* L.; Santiago, April 23, 1953, Ariztia (coll.) from clover seeds; Valparaiso, February 1928, E. P. Reed; Placilla, Colchagua, February 21, 1958, C. Vergasa; Sta. Cruz, Colchagua, May 27, 1928, C. Vergasa.

The lectotype and paralectotypes are teneral specimens, each with red elytra and black sutural stripe, as was indicated in the original description. I have examined two other series composed of teneral as well as fully matured black specimens, both forms having the same distinctive characteristics in the male genitalia.

The nearest relative of this species I have seen is an unidentified species represented by three specimens from Chile reared from *Astragalus curvicaulis* (Clos.) Reiche, a native legume, received

through U.S. Plant Quarantine. Both species belong to a small group which is apparently peculiar to Chile and includes *Acanthoscelides egenus* (Philippi), *A. mutatus* (Pic), *A. scutellaris* (Philippi), and *A. bimutatus* (Pic). All are minute species with the hind femur slender and unidentate, the hind tibia lacking carinae, and with fine denticles basally on certain of the elytral striae.

Although *A. pyrrhomelas* and its related species share the character of the non-carinate hind tibia with *Lithraeus electus* Bridwell and *L. atronotatus* (Pic), the presence of other characters i.e., strial denticles, femoral tooth, presence of a strong mucro on the hind tibia, exclude the *pyrrhomelas* group from *Lithraeus*. For the present, I prefer to leave this group in *Acanthoscelides* (sens. lat.) and treat it as a species group within the genus until the New World genera of Bruchidae are more precisely defined.

The Old World genus *Bruchidius* to which the clover seed bruchids —*Bruchidius alfieri* (Pic), *B. trifolii* (Motschulsky), *B. sericatus* (Germar), and *B. perparvulus* (Boheman)—are presently placed is a composite genus in need of a complete revision, but the four species named above can be distinguished from *Sennius willei* and *Acanthoscelides pyrrhomelas* by the long, serrate male antennae and marked differences in details of the male genitalia (see de Luca, 1958, p. 16).

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ON THE TRUE IDENTITY OF CHOMATOPHILUS WITH DESCRIPTION OF A NEW SPECIES, AND WITH KEY AND CATALOGUE OF ALL SOGONID GENERA[1]

(CHILOPODA : GEOPHILOMORPHA : SOGONIDAE)

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In 1896 when Pocock described *Chomatophilus*, he located it in Geophilidae, whose scope at that time embraced nearly the whole Order Geophilomorpha as we know it today. He stated it to be "near *Himantarium*," which is indeed an apt description of its superficial appearance. Grossly it does rather resemble an himantariid.

Doubtless Pocock's description, figures, and himantariid reference plus the absence in collections of the species and genus have conspired to perplex more careful subsequent authors pertinent to the placement of the genus. Accordingly, in his celebrated monograph of 1929 (Tierreich, Lief. 52, p. 349) Attems could do not more with *Chomatophilus* than situate it in his section of Geophilomorpha of uncertain position (incertae sedis). Chamberlin, as we shall see, having forgotten Pocock's orphaned genus, redescribed it as his own *Nuevona* but correctly located it in Sogonidae.

I have studied Pocock's type in the British Museum (Natural History), find it to be a sogonid, and redescribe it here. My composite description is based, then, both upon a typical and many non-typical specimens.

In many years' study of some of the sogonids I have found the generic keys (all Chamberlin's) not to be very useful: indeed, in places they are ambiguous, obscure, exiguous, and downright wrong. Therefore I present here an improved though still not satisfying key; I have not seen specimens of all genera. Because the generic presentations are so dispersed in space and time I have appended an annotated catalogue of them.

What are sogonids? Chamberlin affirmed them to constitute a taxon of suprageneric level coordinate with the established geophilomorph families. I am inclined to believe they are not. For instance—it has never before been suggested—they have much in common with that as yet untitled section of the Geophilidae clustering around *Clinopodes*. But for the time-being in order to facilitate cleaning the sogonids' rather chaotic Augean stables it is useful to assume that they form a bona fide family, even if in fact they do not. I really suspect that

[1] Undertaken with the aid of a grant from the National Science Foundation. For the specimens that they have generously placed at my disposal I wish to thank G. E. Ball and D. R. Whitehead of the University of Alberta, B. D. Valentine of the Ohio State University, and W. T. Keeton of Cornell University. I am also indebted to G. Owen Evans and J. G. Sheals of the British Museum (Natural History) for their hospitality of many years.

Bismark's comment on Italy,[2] that it is a geographical concept, applies equally well to Chamberlin's Sogonidae: they may well be only a geographical concept, limited, as they are, to the northern Neotropics. I feel confident that had the conservative Attems or the more radical Verhoeff found a typical sogonid in, say, Europe, they would have called it a geophilid.

Chomatophilus Pocock

Chomatophilus Pocock, 1896, Biol. Centr. Americani, Chilop., p. 39.

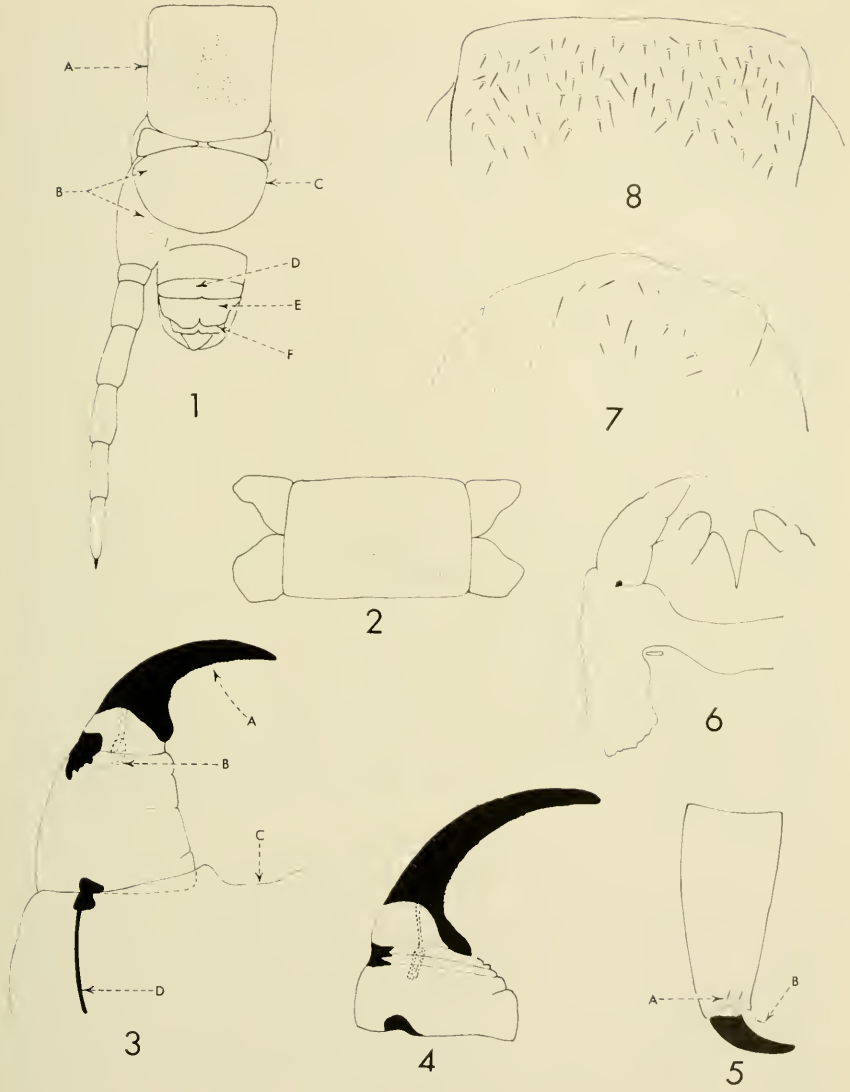
Chomatophilus Pocock: Attems, 1929, Tierreich, Lief. 52, p. 349. (Under Geophilomorpha incertae sedis.)

Nuevona Chamberlin, 1941, Pan.-Pac. Ent. 17:185. Type-species: *Chomatophilus smithi* Pocock, 1896. Monobasic. **New synonymy.**

The following characteristics in combination will distinguish this genus from all others. Body somewhat attenuate anteriorly, dorsoventrally somewhat flattened, rather vermiform. Massive transegmental tracheal trunks arise in segment II and pass posteriorly through many segments. Pleuroprosternal sutures wholly absent. Each ventral porefield undivided, centrally extended forward in a broad arc. Pretarsal anterior parungues double. Ultimate sternite exceptionally broad, its lateral and posterior margins together describing a semicircle. Each coxopleuron with two cryptic, heterogeneous gland cavities. Anal pores heterogeneous like the coxopleural cavities.

GENERAL. Length, to 90 mm. Pedal segments, 85–115. SHAPE. Rather flattened, vermiform. Attenuate at both ends, more so anteriorly. COLOR. Yellowish-orange to whitish-yellow dorsally; ventrally sordid white. ANTENNAE. Rather short, slightly flattened dorsoventrally, somewhat attenuate distally. CEPHALIC PLATE. Slightly domed dorsally; anteriorly rostrate; varying from about as long as wide to slightly longer than wide. Prebasal plate exposed medially. CLYPEUS. Anterocentral fenestra and prelabral plagulae absent. Anterior half sparsely to densely setose. Paraclypeal sutures prominent and complete. LABRUM. Tripartite, the sidepieces merging imperceptibly with the midpiece which extends posteriorly. Pigmented teeth absent; sidepieces with long, posteriorly-directed hyaline filaments; midpiece with much shorter but otherwise similar filaments. MANDIBLE. Corpus distinctly triangular; shaft very short and twisted. Armature a single row of very short hyaline teeth. FIRST MAXILLAE. Coxosternum medially neither diastemate nor suturate; lappets present or absent. Medial lobes triangular, very broad. Telopodite bipartite, with prominent, robust, scabrous lappets. SECOND MAXILLAE. Isthmus anteroposteriorly shallow, transversely wide; without diastema or midlongitudinal suture; areolate, not membranous. Pore opening posteromesad. Postmaxillary sclerites and statuminia absent. Telopodite: robust, short, inflated; without distomesal denticles; basal article with prominent ventral and dorsal condyles; terminal claw short, straight, without basal bristles, non-pectinate, non-fibrous. PROSTERNUM. Greatest width exceeding visible length. Anteriorly with broad, deep diastema; without denticles, or if present, then pale and evanescent. Pleurograms prominent, complete to condyles. Pleuroprosternal sutures entirely absent, not represented

[2] "Italien ist ein geographischer Begriff."



Figs. 1–3, 5–7, *Chomatophilus aphanistes*, n. sp., holotype: 1, penult, ultimate and postpedal segments, ventral, A = penult sternite, B = coxopleural gland crypts, C = ultimate sternite, D = fused female gonopods, E = anal pore crypts, F = adanal laminae; 2, sixth sternite with flanking subcoxae, ventral, sternital porefield shown, those of subcoxae deleted; 3, right prehensor and adjacent prosternum, ventral, A = serrulate ventral edge, B = poison calyx, C = diastema, D = pleurogram; 5, tenth tarsus and pretarsus, anterior surface, A = paired anterior parungues (deflected proximad), B = single posterior parunguis; 6, first and second maxillae, ventral; 7, clypeus. Figs. 4 and 8, *C. smithi* Pocock: 4, right prehensor, ventral; 8, clypeus.

posteriorly by fragments. PREHENSORS. Basal articles short and broad, claw relatively long. Flexed, not attaining anterior head margin. Mesal denticles, basal tooth both absent. Ungular ventral edge smooth or irregularly serrulate; ungular dorsal and ventral surfaces not appressed. TRACHEATION. Apart from the usual dorsal oblique connectives with a subdorsal system of transsegmental trunks running anteroposteriorly. Four thereof arising in segment II passing caudad and joined in Segment VI by four additional, all terminating variously somewhere anterior to body mid-length. PARATERGITES. Absent. LEGS. Short and robust, very sparsely setose. Each pretarsus with two anterior parungues and one posterior parunguis. STERNITES. All wider than long. Sculpturing coarsely areolate. Setae minute, sparse. *Carpophagus*-structures absent. Those more anterior with very shallow midlongitudinal sulci. Subcoxal porefields present, extensive. Sternital porefields: on one through penult; undivided, each in the form of a transversely wide posterior band with its middle extended anteriorly in a broad arc, the extension on posterior segments much more extensive than on anterior segments. Formed anterolateral porefields absent, represented by irregularly scattered single spores. ULTIMATE PEDAL SEGMENT. Pretergite entire, laterally not fissate. Tergite shieldshaped, narrowed, posteriorly; length about equal to greatest width. Presternite medially divided. Sternite: much wider than long; sides and rear margin together describing a broad semicircle. Coxopleuron: only slightly inflated, relatively short and small, not encroaching upon penult segment; each with two ventral cryptic gland cavities, these heterogeneous, composite, with inclusive canals and lumina irregularly formed by a distinctive papillate membrane, the anterior pit often partly concealed by penult sternite. Telopodite: somewhat longer than penult; articles more or less swollen depending upon sex and species; with two tarsalia; pretarsus distinctly unguiform, basally not filamentous.[3] POSTEPEDAL SEGMENTS. Male gonopods widely separated, biarticular. Female gonopods each uniarticular, medially fused without demarcation. Anal pores notably large, each internally composite and heterogeneous with constituent canals and papillate membrane therein like the coxopleural crypts.

Chomatophilus aphanistes, n. sp.

The new species, although indisputably congeneric with *smithi*, is very different from it in many particulars of infrageneric rank. Grossly different from *smithi*, *aphanistes* is shorter and mesopodal; the Pocock form is distinctively polypodal and sizeable. Furthermore in *smithi*: (1) pedal pairs, 81–115. (2) Tarsungular ventral edge is mostly smooth, with shallow, irregular serrulations only proximally. (3) Clypeal setae robust and numerous; present anterolaterally. (4) Porefield of sternite one with posterolateral extensions. (5) Female ultimate legs notably inflated. (6) Second maxillary coxosternal lappets absent. (7) Tarsungular blade far exceeding length of basal articles. In *aphanistes*: (1) pedal pairs, 47–59. (2) Tarsungular ventral edge finely, regularly serrulate over entire length. (3) Clypeal setae delicate, less numerous; absent anterolaterally. (4) Porefield of sternite one strictly subcentral, without posterolateral extensions. (5) Female

[3] Compare with *Garrina*, wherein rear leg pretarsi, including the ultimate, although typically unguiform, are basally conspicuously fibrous, which in the Geophilomorpha is most uncommon.

ultimate legs at most very slightly inflated. (6) Second maxillary coxosternal lappets present. (7) Tarsungular blade not greatly exceeding length of basal articles. There are additional differences, but the foregoing seem the most useful and obvious.

Holotype: female. Mexico, San Luis Potosi, on route 80 4.3 miles east of Ciudad del Mais at 4,300′ elevation. August 10, 1966. G. B. Ball and D. R. Whitehead, legg. Deposited in the U. S. National Museum.

GENERAL. Length, 30 mm. Pedal segments, 57. Body shape, anteriorly and posteriorly slightly attenuate. Color: antennae and dorsum pale yellow; venter sordid white. ANTENNAE. Length to head length, 8:3. Filiform, distally attenuate slightly, slightly flattened dorsoventrally. CEPHALIC PLATE. Greatest width to length, 9:8. Setae very short and sparse. Frontal suture barely visible as a band of weaker areolation. Prebasal plate slightly exposed medially. CLYPEUS. Paraclypeal sutures prominent and complete. Anterocentral fenestra and prelabral plagulae absent. Setae: relatively long and delicate; few in number, forming two groups, a central one of 4 girdled by a setal semicircle; none anterolaterally. LABRUM. Sidepieces merging with midpiece. Entire labral margin fringed with hyaline filaments, these very long on sidepieces but notably shorter on midpiece. FIRST MAXILLAE. Coxosternum with 15 setae dispersed irregularly in two files. Medial lobes relatively long and wide, their intervening diastema comparatively deep. Coxosternal lappets narrow, pointed, much shorter than telopodite lappets. Telopodites: bipartite, each with a thick scabrous lappet. SECOND MAXILLAE. Isthmus comparatively shallow; medially areolate, neither membranous, suturate, nor diastemate. Postmaxillary sclerites absent. Telopodite: prominent dorsal and ventral basal condyles present; relatively short and inflated; without denticles or protuberances; terminal claw short and weak, not exceeding neighboring setae. PROSTERNUM. Greatest width exceeding exposed length. Anteromedial diastema broad and relatively deep, denticles absent. Pleurograms prominent, complete to condyles. Pleuroprosternal sutures entirely absent. PREHENSORS. Flexed, not attaining anterior head margin. Mesobasally with a very low swelling. Ungular blade ventrally coarsely and irregularly serrulate; ungula not notably recurved, not uncinate. Poison calyx in lower tarsungula; poison gland terminating in trochanteroprefemur. STERNITES through penult. Setae short, very sparse. Each with a very shallow midlongitudinal depression. *Carpophagus*-structures absent. Porefields: present on first through penult; on anterior sternites (except first) each a posterior, transverse, uninterrupted band medially extended forward in a low, broad arc; on more posterior sternites the mediocephalad extensions become wide and very long eventually occupying most of the paramedian length of each sternite. LEGS. Setae very sparse and minute. Rear legs dorsally not flattened. Pretarsi: each with two anterior and one posterior parungues, essentially equal, minute. ULTIMATE PEDAL SEGMENT. Pretergite very wide, not fissate laterally. Tergite greatest length about equal to greatest width. Presternite medially entirely separated by wide membranous area. Sternite: greatest width far exceeding length; sides and posterior margin conspicuously rounded, nearly semicircular. Coxopleuron: comparatively small, slightly inflated, a patch of setae on posteroventral surface, otherwise nearly glabrous; each with two deep cryptic gland cavities,

these of the heterogeneous type with many constituent canals, their lumina lined with a distinctive papillate membrane.[4] Telopodite: longer than penult; the articles but slightly swollen; the two tarsal articles equal in length and diameter; pretarsus clearly unguiform. POSTPEDAL SEGMENTS. Sparsely setose. Female gonopods uniarticulate and completely fused medially without demarcation. Anal pores, like coxopleural crypts, internally heterogeneous and lined with convoluted papillate membrane.

Paratypes. There are 37 paratypes representing many localities in four Mexican States. All agree closely with the holotypic description, except that in the males the ultimate legs differ in being much swollen. Pedal segments, 47–59, mode 51. Lengths, 15–30 mm. U. S. National Museum collection.

VERACRUZ. Slope of Vulcan San Martin north of San Andres Tuxtla, July 20–August 1, 1959, Keeton and Valentine. San Andres Mountains, Bastanal, 2500′–3000′, September 19, 1965, Ball and Whitehead. Lake Catemaco, Coyame, July 2, 1963, Whitehead. San Andres Mountains, 25 miles west of Contecompan, 100′, September 18, 1965, Ball and Whitehead. SAN LUIS POTOSI. 18 miles east of Ciudad del Mais, September 3, 1964, Awram and Whitehead. 24.7 miles east of Landa de Matamoros, 5000′, October 18, 1965, Ball and Whitehead. 4.3 miles east of Ciudad del Mais, July 10, 1966, 4300′, route 80, Ball and Whitehead. Ciudad del Mais, September 3, 1964, Whitehead. TAMAULIPAS. 8.1 miles west of Encino, 3100′, October 11, 1965, Ball and Whitehead Gomez Farias, Aqua Livida, 5800′, October 9, 1965, Ball and Whitehead. 8 miles northwest of Gomez Farias, Rancho del Cielo, 3800′, August 6, 1965, Ball and Whitehead. OAXACA. 21.8 miles north of Tuchatengo, July 18, 1966, Ball and Whitehead.

Chomatophilus smithi Pocock

Chomatophilus smithi Pocock, 1896, Biol. Centr. Amer., Chilopoda, p. 39.
Chomatophilus smithi Pocock: Attems, 1929, Tierreich, Lief. 52, p. 349. (As Geophilomorpha incertae sedis.)

GENERAL. Length, to 90 mm. Pedal segments, 81–115. Shape, anterior and posteriorly attenuate. Color: antennae and dorsum yellowish-orange; venter sordid white. ANTENNAE. Length to head length ca. 11:4. Filiform, distally slightly attenuate, dorsoventrally slightly flattened. CEPHALIC PLATE. As wide as long to slightly longer than wide. Setae short and sparse. Frontal suture barely visible as a band of weaker areolation. Prebasal plate slightly exposed medially. CLYPEUS. Paraclypeal sutures prominent, wide, complete. Anterocentral fenestra and prelabral plagulae absent. Setae: relatively long, notably robust and numerous; only on anterior half of clypeus; present anterolaterally. LABRUM. Sidepieces margin with midpiece without clear demarcation. Entire labral margin fringed with hyaline filaments, those of sidepieces much longer than those of midpiece. FIRST MAXILLAE. Coxosternum with some 30 robust setae, these irregularly disposed. Medial lobes long and very wide, the intervening

[4] For further discussion of this membrane in sogonids and other taxa see Crabill, 1961, Proc. Ent. Soc. Wash. 63:132.

cleft deep. Coxosternal lappets absent. Telopodites: bipartite, each with a robust scabrous lappet. SECOND MAXILLAE. Isthmus comparatively shallow; medially areolate, not hyaline or suturate or diastemate. Postmaxillary sclerites absent. Telopodite: prominent dorsal and ventral condyles present; relatively short and much inflated; without denticles or protuberances; terminal claw rather long, exceeding neighboring setae. PROSTERNUM. Greatest width exceeding visible length. Anteromedial diastema broad and deep, with low evanescent denticles in most. PREHENSOR. Flexed, not surpassing front of head. Without mesal denticles but tarsungula mesobasally swollen. Ungular blade smooth for most of its length (proximally with a few shallow serrulations). Poison calyx in lower tarsungula. Poison gland terminating in lower trochanteroprefemur. STERNITES through penult. Setae short and very sparse. Each with a very shallow midlongitudinal depression. Porefields: present on first through penult; on anterior sternites (including the first) each a very wide, transverse and uninterrupted band medially extending forward in a prominent arc; on posterior sternites the mediocephalad extension becoming very wide and long, eventually occupying most of the paramedian length of each sternite. LEGS. Setae very sparse, minute. Rear legs dorsally somewhat flattened. Pretarsi: each with two[5] anterior and one posterior parungues, these essentially equal and minute. ULTIMATE PEDAL SEGMENT. Pretergite wide, laterally not fissate. Tergite greatest width about equal to length. Presternite medially broadly divided. Sternite: greatest width far exceeding length; sides and rear conspicuously rounded, nearly semicircular. Coxopleuron: comparatively small, slightly inflated, with a patch of setae ventroposteriorly; each with two deep cryptic gland cavities, these of the heterogeneous type with numerous constituent canals, their lumina lined with a distinctive papillate membrane. Telopodite: longer than penult; the articles in both sexes notably inflated; distotarsus notably shorter than proximotarsus; pretarsus distinctly unguiform. POSTPEDAL SEGMENTS. Sparsely setose. Female gonopods uniarticular, medially broadly fused without demarcation; male gonopods biarticular, medially widely separated. Anal pores, like coxopleural crypts, internal heterogeneous with inclusive canals and lining papillate membrane.

The holotype in the British Museum (number 1897.3.1.127) has no more precise locality than "Amula" on its ticket. In the original description Pocock places Amula in the State of Guerrero at 6000 to 7000 feet elevation. Several very extensive Mexican gazetteers fail to reveal this place name, but they do give a number of listings for Amole, at least one of which is in Guerrero. It seems possible that Amula is a misspelling of Amole. I have examined the holotype, and in addition specimens collected in the following localities. SAN LUIS POTOSI. 19.3 miles northwest of Tamazunchale on route 85. Near Ciudad del Mais. NUEVO LEON. Chipinque mesa near Monterrey. QUERATARO. Near Pinal de Amoles. TAMAULIPAS. Near Gomez Farias, Racho del Cielo.

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[5] The presence of two anterior parungues, instead of the usual one, is most uncommon in the Geophilomorpha. Elsewhere I have encountered it only in the Schendylidae.

Key to Sogonid Genera

The following key is partly based upon Chamberlin's published descriptions and keys, which portions remain to be verified through direct recourse to specimens. I assume responsibility for the placement and identification of those genera (signaled by asterisks) material of which I have studied. Those familiar with Chamberlin's several sogonid keys (e.g. in Univ. Utah Biol. Series, VII (3):17, 1943) will note that, unlike him, I have not dichotomized the conditions of the ultimate pretarsus, that is, pretarsus a claw versus pretarsus a tubercle, which in my key might have been introduced in the fifth couplet. This is because I have found both conditions to be intragenerically variable within *Garrina* and *Sogona*. In fact, I have seen specimens of both genera wherein in the same specimen one ultimate pretarsus could be called tuberculate, the other unguiform.

1a. Ultimate tarsus consisting of one article; ultimate pretarsus absent; each coxopleuron with one crypt ..... **Timpina** Chamberlin
1b. Ultimate tarsus consisting of two articles 2
2a. Each coxopleuron with one crypt ..... **Gosipina** Chamberlin
2b. Each coxopleuron with two crypts 3
3a. Ventral pores absent; ultimate pretarsus absent ..... **Oligna** Chamberlin
3b. Ventral pores present 4
4a. Tarsungula with basal tooth ..... **Portoricona** Chamberlin*
4b. Tarsungula without basal tooth 5
5a. Pleuroprosternal sutures entirely absent; ultimate sternite posteriorly broadly rounded ..... **Chomatophilus** Pocock*
5b. Pleuroprosternal sutures present, complete or broadly incomplete; ultimate sternite posteriorly not broadly rounded 6
6a. Pleuroprosternal sutures widely incomplete, not reaching anterior margin ..... **Garrina** Chamberlin*
6b. Pleuroprosternal sutures complete, reaching anterior margin ..... **Sogona** Chamberlin*

Catalogue of Sogonid Genera

The following names, not all of which belong there, have been referred to Sogonidae. An asterisk indicates I have seen material.

Andenophilus Verhoeff (? = Oryidae)

Andenophilus Verhoeff, 1942, Titschack's Fauna Perus, II, p. 62.

Type-species: *A. striatus* Verhoeff, 1942. Monobasic.

Remarks: Except for the mandible, Verhoeff has described a very typical oryid. Indeed, his species is otherwise so oryid that I can only believe him to have erred in describing the mandible. But apart from the question of what *Andenophilus* is, it is indubitably not a sogonid.

Chomatophilus Pocock*

Chomatophilus Pocock, 1896, Biol. Centr. Amer., Chilop., p. 39.

Nuevona Chamberlin, q.v. **New synonymy.**
Type-species: *C. smithi* Pocock, 1896. Monobasic.

Garrina Chamberlin*

Garrina Chamberlin, 1915, Bull. Mus. Comp. Zool. Harv. 59:506.
Pycnona Chamberlin, q.v. **New synonymy.**
Type-species: *G. ochra* Chamberlin, 1915. Original designation.

Gosipina Chamberlin

Gosipina Chamberlin, 1940, Pan.-Pac. Ent. 16:56.
Type-species: *G. bexara* Chamberlin, 1940. Original designation, monobasic.

Idiona Chamberlin (= *Arctogeophilus*, **new synonymy**)

Idiona Chamberlin, 1946, Can. Ent. 78:69.

Type-species: *I. shelfordi* Chamberlin, 1946. Original designation, monobasic.
Remarks: The genus can only be a junior synonym of the chilenophilid genus *Arctogeophilus*.

Nuevona Chamberlin (= *Chomatophilus*, **new synonymy**)

Nuevona Chamberlin, 1941, Pan.-Pac. Ent. 17:185.

Type-species: *N. leonensis* Chamberlin, 1941. Original designation and monobasic.

Oligna Chamberlin

Oligna Chamberlin, 1943, Univ. Utah Biol. Ser. 7:19.

Type-species: *O. pueblana* Chamberlin, 1943. Original designation and monobasic.
Remarks: I believe there is at least some reason for suspecting the genus to be a junior synonym of the dignathodontid *Pagotaenia* Chamberlin, but under the circumstances this cannot be proved without recourse to the types. Nonetheless, the reader is alerted to the possibility.

Portoricona Chamberlin*

Portoricona Chamberlin, 1950, Proc. Biol. Soc. Wash. 63:159.

Type-species: *P. adjunta* Chamberlin, 1950. Original designation.

Pycnona Chamberlin* (= *Garrina*, **new synonymy**)

Pycnona Chamberlin, 1943, Univ. Utah Biol. Ser. 7:18.
Type-species: *P. pujola* Chamberlin, 1943. Original designation.

Sogona Chamberlin*

Sogona Chamberlin, 1912, Bull. Mus. Comp. Zool. Harv. 54:431.

Type-species: S. *minima* Chamberlin, 1912. Original designation and monobasic.

Timpina Chamberlin

Timpina Chamberlin, 1912, Bull. Mus. Comp. Zool. Harv. 54:433.
Type-species: *T. texana* Chamberlin, 1912. Original designation and monobasic.

ON THE LIFE OF VESPULA VULGARIS (L.) AND V. MACULIFRONS (BUYSSON)
(HYMENOPTERA: VESPIDAE)

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The observations reported here pertain to living colonies of *Vespula vulgaris* (L.) and *V. maculifrons* (Buysson) taken at Eaglenest Lakes near Ely in northeastern Minnesota. They have to do with nests, seasonal development and certain interrelations of the two species. *V. vulgaris* and *maculifrons* are close relatives in the subgenus *Vespula*.

LIFE OF *Vespula vulgaris*

The six colonies, identified by capital letters A–F, are described separately and treated in chronological order of the months and days on which they were removed from their nesting sites for analysis. Thus they afford data pertinent to the seasonal distribution of the several castes.

A. The colony developed inside a small dark pumphouse, where the nest was attached to the door casing. Two combs were under construction on July 1, 1961. The central or discal zone of comb 1 had yielded 20 workers, of which only 14 were present when the colony was inactivated at night with cyanide gas. The mother queen also was taken. Outwardly from the discal zone there occurred successively (1) a zone of 41 capped cocoons containing pupal workers, (2) a zone of submature to small worker larvae and (3) a zone of peripheral cells containing eggs. Moreover, the second life cycle or brood generation was represented by eggs and small larvae in the renovated discal cells in which the workers had developed.

The small apical or distal comb comprised about 51 incomplete cells that housed only eggs and small larvae.

Previous observations on *Vespula* at Eaglenest Lakes indicate that colony A was founded on or about June 1. Development through the embryonic, larval and pupal stages of *Dolichovespula maculata* (L.) required 26–30 days (Balduf, 1954). Therefore it is estimated that the first worker *vulgaris* emerged from their cocoons shortly before June 28.

B. The nest hung in full view from the ship-lap siding on the shaded south side of a cabin. First seen on June 19, 1959 (fig. 1), it was left intact until July 10. The process of applying paper pulp, by the sole worker present in the nest, was as described by Duncan (1939, p. 122).

[1] My thanks go to Messrs. Karl V. Krombein, U.S. National Museum and C. D. F. Miller, Entomology Research Institute, Ottawa, Canada, for assistance in determining the wasps.

However, one aspect of this procedure seems to have been overlooked. This I have seen frequently also in *D. maculata* and *D. arenaria* (Fabr.). It is as follows.

When the *vulgaris* worker returned from the field bearing a mass of paper pulp destined for application to an incomplete layer of the nest envelope, it did not advance directly to apply the material, but *invariably first entered the nest.* After passing a few seconds there, it emerged, still holding the pulp intact, and chose a place on the envelope, where it then applied it in the meticulous manner described by Duncan. Having thus disposed of the load, the worker did not fly directly from the envelope to the field, but again entered the nest for another brief stay, after which it emerged to fly to the field.

All activity had ceased in this nest before July 10. The envelope consisted of two almost complete outer layers, and two inner ones whose apical parts had been cut off. The single comb was circular, only 21 mm in diameter, and comprised 42 uniformly small cells. Workers had developed in 6 cocoons in the discal zone, while three contained mummied pupae. The remaining 33 outer cells remained incomplete. One worker lay dead in the nest. The queen seems to have been absent since before June 19.

C. The oval shape of this nest conformed to the abandoned lair of a chipmunk (*Eutamias*) in which it had developed. The top remained visible through the oblique runway of the mammal, and the bottom rested on the floor of the cavity nine inches below the surface of the ground.

When dug out on August 15, 1956, the nest comprised four roundish combs. Beside the 577 active workers captured, 550 white-capped pupal cells had been formed in the basal combs. These cells were of the same size as those from which workers had emerged, hence contained worker pupae. Also some prospective workers probably remained in the basal combs as second brood larvae, while some adult workers had already died. The mother queen, taken when the nest was disassembled, remained actively reproductive. Juvenile males and queens had not appeared but probably existed as larvae in combs 3 and 4.

D. The nest occurred in a shallow subterranean cavity that had been formed by collapse of a rotting log. Latter was covered by a layer of small boulders and soil. Access to the nest was by a round hole ⅘ in. in diameter at the base of a quaking aspen. Four combs of irregular shape had been constructed. A total of 528 *vulgaris* was captured after dark of August 17–25, 1955. They comprised 524 workers, three juvenile males and the dead mother queen, that had concealed herself between combs 1 and 2 in the top of the nest. Production of adult reproductives had just begun.

This colony also contained seven workers of *V. maculifrons.*

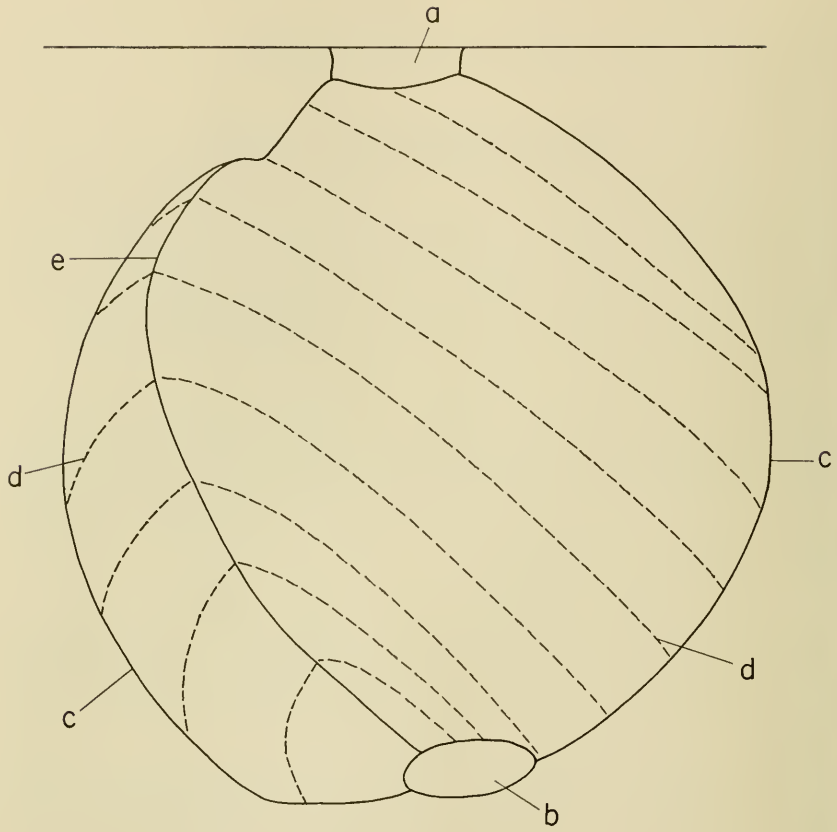

Fig. 1. Aerial nest of *Vespula vulgaris* (L.), frontal view, somewhat diagrammatic: a, suspensorium; b, entrance; c, c, edge of nest; d, d, dashed lines represent margins of strips of nest envelope; e, groove where strips meet.

E. The colony inhabited a cavity in a rotting stump: latter measured six inches in diameter and 14 inches in height. When removed from its site on August 31, 1954, the nest comprised seven oval combs whose maximum diameters ranged from 4.5 down to 3.5 inches. Taken through September 1–5 were 472 workers, 13 young males and nine queens. The queen mother had disappeared. Pupae in the number of 147 from cocoons in comb 5 were identified as 126 males and 21 queens.

The cocoons of the seven combs were of two distinct sizes, the smaller produced workers, the larger males or queens. Accordingly, combs 1, 2, 3 and about ⅞ the area of comb 4, comprised worker cells; whereas ⅛ of comb 4 and all of 5, 6 and 7 consisted of male and queen

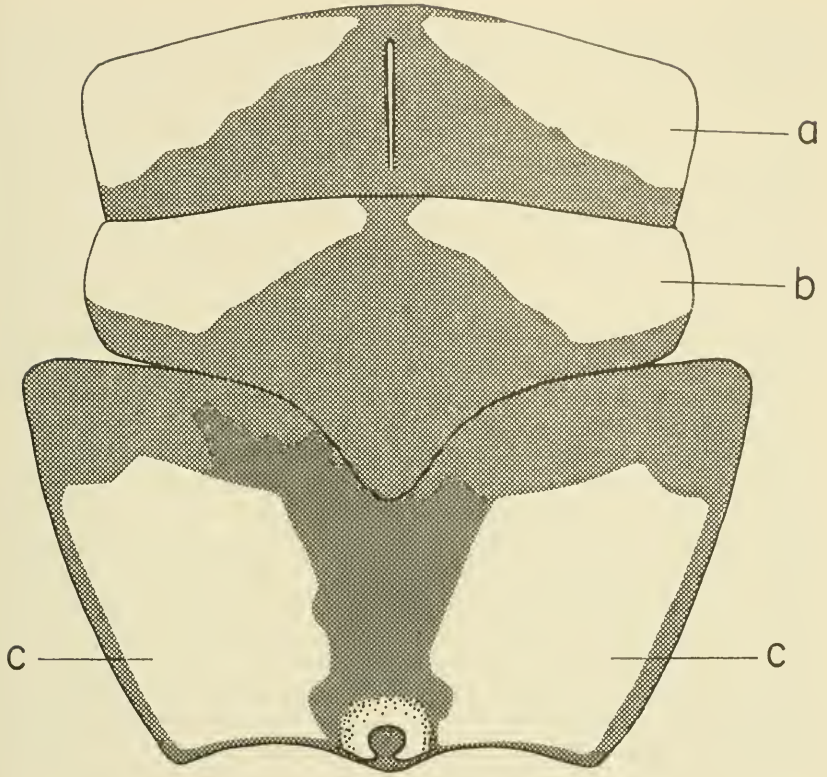

Fig. 2. Mesoscutellum, metanotum and propodeum of *Vespula maculifrons* (Buysson): a, mesoscutellum; b, metanotum; c, c, pair of subquadrate yellow patches on propodeum.

larvae or pupae. Combs 5 and 6 had produced some adults but most of the cells still housed pupae, with a few larvae in their peripheral zones. Comb 7 presented a solid block of 112 new white pupal cocoons of uniformly large size, and a marginal zone of larger larvae, but no eggs. The absence of eggs and the existence of some immature larvae indicate the mother queen had ceased functioning only a few days before September 5.

Almost the entire potential of workers in combs 1–4 had been realized, whereas the component of the reproductive caste would have continued to increase through much of September. Total frosts in this interlake area may be delayed until October.

F. The nest was built between two rafters on the north eave of a neighbor's pumphouse. Being broad and short, it protruded but little below the sloping overhang, and the entrance remained invisible because located close to a rafter.

On September 3, 1967, three days before the nest was taken down, the owner of the premises attempted to eliminate the wasps by directing a forcible stream of water at it, but only tore the fragile envelope off, hence left the combs exposed. On the night of September 5, the combs had been covered again but thinly. Moreover, numerous workers continued at work on the envelope, illumined dimly by a distant porch light. Hence, my decision to delay taking the colony on the sunny morning of September 6.

In two hours, use of a light net reduced the worker force to safe numbers. The fragile combs broke into pieces when they fell 9 feet to the ground. Four combs had been constructed. The total of 321 adult *vulgaris* captured comprised 247 workers, the living queen mother, 19 daughter queens and 54 young males. A few adults escaped when the nest crashed to the ground. Additional pupal reproductives remained in the combs.

This *vulgaris* nest also contained 8 workers of *V. maculifrons*.

Nesting material of vulgaris. In his review of materials employed by Vespine wasps in building their nests, Duncan (1939, p. 121) states that *V. vulgaris* "seems definitely to prefer thoroughly decayed wood in the brown rotten stage." All my nests of this species confirm the Duncan conclusion, since all consisted of such fragile, friable or crumbly wood. This fragility necessitates extreme care in order to remove the nests undamaged from their niches. It may explain also why the strips that form the nest envelopes extend obliquely to vertically over the surface (fig. 1) rather than circumferentially as on the nests of other Eaglenest Vespulas.

Life of Vespula maculifrons

Certain colonies of *Vespula* described in this article afford indications that *V. maculifrons* on occasions maintains three modes of life, as follows: (1) it lives as an independent free-breeding species, (2) as an inquiline of *V. vulgaris* and (3) interbreeds with *vulgaris*.

1. I have one colony (G) that consisted entirely of *V. maculifrons*. It nested in the attic of a cabin where it was both invisible and inaccessible to me. The queen was discovered on June 17, 1959 after the nest had been founded, and the first worker appeared on June 27. Juvenile workers loafed at the emergence hole in the cabin wall through much of the summer. From September 22–27, I netted workers as they arrived and departed from the wall. Adding several taken previously, my collection totalled 72. Although not seen after July 1, the queen performed her reproductive function most of the summer, as may be judged by the number and duration of the worker progeny. Juvenile males and queens were not seen.

The 72 workers are remarkably uniform in color pattern, i.e. the black antennal scape, yellow outer orbits and the pair of large squarish

propodeal patches. On the other hand, the markings of the clypeus and the shapes of the yellow hind margin of the pronotum lean toward *vulgaris*. However, this form appears to be only one of several now included under the name *maculifrons* (Miller, 1961, p. 10), hence the final concept of the species remains to be determined.

2. *Vulgaris* colonies D and F were unique in housing small numbers of worker *maculifrons*. Colony D, taken through August 17–25, 1955, contained seven, and colony F, netted on September 6, 1967, harbored eight worker *maculifrons*. These workers, like the 72 obtained from my free-living colony G above, bore the pair of large yellow propodeal spots (fig. 2). Miller (1961, p. 10) found this same xanthic form of *maculifrons* "rare and sporadically" distributed throughout the population of *vulgaris* where it made up less than 5% of each colony.

Certain observed facts indicate the procedure by which this bilateral relation takes place. First, the two related species *V. maculifrons* and *vulgaris* coexist in the Eaglenest Lakes area. Here they also commonly develop independently. Since neither a mother queen, nor juvenile queens or males occurred in colonies D and F, this minority component of worker *maculifrons* can have originated only in a free-breeding colony. The workers in such colonies of *maculifrons* emerge from their cocoons approximately between late June and early September. It must be supposed that some workers, incident to foraging for food and paper pulp, discover a nest of *vulgaris*. By devious devices, a few become established in the nest guarded by somewhat hostile worker *vulgaris*. Establishment of this minority is most likely to take place during August when the worker caste is presumably at its numerical peak. This is suggested by the fact that colonies D and F contained *maculifrons* late in August and early September. Yet it is possible that this relation may be established as early as July.

Considering that the mortality rate of workers is high, the composition of the *maculifrons* element in *vulgaris* nests may change significantly during the season. This presumes that the *maculifrons* of *vulgaris* colonies are not relieved of acquiring their own food in the field. And while so engaged some may return to their native home.

Conclusion: the small minorities of *maculifrons* found in colonies of *vulgaris* perform in the role of inquilines, temporary and occasional.

3. Colony H gives evidence of interbreeding between *V. vulgaris* and *maculifrons*. It nested beyond sight and access in the double wall of a cabin. The annoying workers suffered destruction from swatters and chemicals. It was estimated that 300 adults had been destroyed by August 15, 1961. I selected a sample of 13 workers in good condition for study, and recovered the battered queen *vulgaris*.

That the male parent was a *maculifrons* is shown by the typical yellow outer orbits and the pair of large subquadrate yellow propodeal patches displayed by all the 13 workers. Other characters of the

workers varied widely from the *maculifrons* I have from colony G to the *vulgaris* from colonies A to F. The intergradation pertained particularly to the following features: the clypeal color pattern ranged from immaculate to spotted to a short median stripe to fully anchor-shaped. Likewise the yellow hind margin of the pronotum varied from narrow-parallel as in *vulgaris* to very wide as in extreme *maculifrons*. A much larger sample from this colony could scarcely have shown more diversity in these characters than the 13 workers taken.

Summary

Life of *vulgaris*. The overwintered queen founds her nest late in May to early June at Eaglenest Lakes, Minn. near Ely. The first workers emerge from their cocoons late in June. By mid-August, the number of workers reaches several hundreds, and continues to increase until about September 1, when colony D contained 524. Thereafter the worker force diminishes, since the queen mother begins laying male and queen eggs about August 1. Juvenile males appear somewhat before the young queens, and in larger numbers. A few males but no queens had appeared on August 25, and a sharp increase had resulted in colony E on September 5. Colony F, taken on September 6 contained 54 males and 19 daughter queens. Emergence of this caste may continue into late September. The queen mother of colony B had disappeared before July 1, while that of colony F remained active on September 6. The latter had a productive lifetime of more than three months.

Since the above six colonies developed in six different years, the varied weather conditions obviously affected the dates of the events described.

Life of *maculifrons*. Evidence is presented that shows *maculifrons* may perform as (1) a free-breeding species; (2) a small number of workers become established as inquilines in nests of *vulgaris*, and (3) *maculifrons* and *vulgaris* sometimes hybridize. In the latter instance the mother queen was a *vulgaris*.

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SNELLENIUS IN THE NEOTROPICAL REGION
(HYMENOPTERA: BRACONIDAE: MICROGASTERINI)

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Snellenius was originally described by Westwood from specimens collected in New Guinea and has since been recorded from Borneo, China and Japan. In 1933 Brues described a species from the Oligocene Baltic amber which he included in the genus but the thoracic structure is such that the insect is probably incorrectly placed. If this fossil is omitted, *Snellenius* currently includes five species, all of which appear to be uncommon. It was therefore quite surprising to find in material from South America several undescribed species which were relatively well represented by specimens.

The generic placement of these insects proved to be difficult as the material would not fit into any of the tribes recognized by Telenga in 1955. The antennae and wing venation are definitely microgasterine in character, but the very deep notaulices and other features are aberrant. At the United States National Museum no identified comparable specimens were located, but Dr. Marsh remembered seeing a species of similar insects and kindly arranged to have the 24 specimens involved loaned to me for study.

Examination of the Neotropical material has disclosed that the characterization of the genus must be altered somewhat. The features which seem to help follow:

Eyes hairy; occiput immargined; antennal segments flattened to nearly terete; antennae 18-segmented; notaulices deeply impressed, crenulate; median lobe of mesoscutum distinctly higher than lateral lobes, with its side margins raised and a low longitudinal carina along the middle; the notaulices separated behind only by a high keel-like carina; prescutellar fovea broad and deep; scutellum margined along the sides by a distinct rounded carina; antero-laterad of scutellum and laterad of prescutellar fovea a pair of impressed ear-like lobes; band bordering scutellum broadly interrupted on posterior portion; sternauli deep, coarsely crenulate; prepectal carina either complete and distinct from in front of sternauli across the venter, or incomplete and reduced to a mere ridge across the anterior end of the median sternal groove only; median sternal groove broad, trough-like and crenulated; propodeum with a prominent median carina, the remaining sculpture varying from coarsely foveolate with very high carinae to nearly reticulate-rugose, the dorsal and posterior faces either distinctly separated by an angle or indistinctly limited and the profile appearing rounded. Forewing with three cubital cells, the second (areolet) small (but large for Microgasterinae) and closed by second intercubitus; second intercubitus mostly transparent, joining second abscissa of radius; third abscissa of radius indicated by pigmented line which may be curved so it appears concave behind; nervulus from nearly interstitial (see Westwood's drawing) to postfurcal to the point where the first abscissa of discoideus is at least two-thirds as long as the second. Cubitellan cell closed; nervellus not

sinuate, curved inwardly; vannal lobe differentiated. Hind coxa small, approximately as long as first abdominal tergite; spurs of hind tibia very small, their length less than the apical width of the robust hind tibia. Abdomen sessile; first abdominal tergite with a narrow median sclerotized plate with nearly parallel sides and with broad membranous lateral portions in which the spiracles are located (these side portions may be folded downward in mounted specimens so the abdomen appears to be petiolate).

The Neotropical species of *Snellenius* run to *Microplitis* in the keys by Muesebeck 1922, Fahringer 1936, Morley 1936, and De Saeger 1944. In Nixon's 1965 key they may not fit the first two characters given in couplet 11.

The major features assisting in recognition of the genus are the following: the unusual thoracic structure (including the deep notaulices, margined scutellum, the median sternal groove, the large, crenulated sternauli, and the foveolate area beneath the forewing); the narrow parallel-sided median plate of tergite 1; the relatively large second cubital cell; the short tibial spurs and robust hind tibiae. The head may or may not be relatively small; the propodeum may or may not be sharply angled as seen in profile from the side; the antennal segments may be strongly flattened to nearly terete.

The following key, which is practically that of Nixon in the first five couplets, should aid in recognition of the species included in the genus.

1. Disc of scutellum reduced to a small, blunt, erect cone; flagellar segments strongly flattened ..... **vollenhovii** Westwood
   Disc of scutellum not cone-like but flattened and with strong raised lateral margin 2
2. Notaulices shallow, flagellar segments weakly flattened ..... **radicalis** Wilkinson
   Notaulices very deep, crenulated, separated behind by only a narrow, keel-like carina; middle lobe of mesoscutum decidely raised above lateral lobes 3
3. Propodeum with carinae high and so coarsely reticulate that between lateral and median carinae not more than 3 or 4 hollows occur along a transverse line 4
   Propodeum not so coarsely reticulate, the carinae lower and the number of hollows between the median carina and the lateral carina more numerous; median plate of first tergite a little more than twice as long as its apical width; notaulices narrowing anteriorly and lateral edges of median lobe of mesoscutum not upturned ..... **theretrae** Watanabe
4. Temples rugose; hind femur with well developed keel on apical two-fifths on inner side 5
   Temples smooth or scabrous-punctate; hind femur without keel 6
5. Head deeply emarginate between the almost angular corners of the temples; forewing nearly hyaline ..... **philippinensis** (Ashmead)
   Head weakly emarginate, temples without prominent angles; forewing deeply infuscated ..... **gelleus** Nixon
6. Prepectal carina complete, extending from in front of sternauli across venter;

vertex and temple scabrous-punctate; plate of tergite 1 a little more than twice as long as broad at apex 7

Prepectal carina incomplete, extending across median sternal groove only; vertex and temple mostly smooth; plate of tergite 1 at least 3 times as long as broad at apex 8

7. Coloration involving red, black, and yellow; mediella nearly as long as first abscissa of basella ..... **tricolor**, n. sp.

Coloration involving only red and black; mediella approximately three-fourths as long as first abscissa of basella ..... **bicolor**, n. sp.

8. General body color piceous; penultinate segment of maxillary palpus less than half as long as the ultimate ..... **atratus**, n. sp.

General body color testaceus; penultimate segment of maxillary palpus at least half as long as the ultimate ..... **peruensis**, n. sp.

Snellenius tricolor, n. sp.

Holotype: ♀, bearing the following data on the label "Argentina: Horco Molle, Tuc. Apr. 3–10, 1966 L. A. Stange." Deposited in the U. S. National Museum.

Length: Head and thorax 1.7 mm, abdomen 1.3 mm, antenna 3.5 mm, forewing 3 mm.

Black or piceous: Head, sides of thorax below, venter, scutellum and portions of propodeum. Antennae deep brown, mesoscutum (and other portions of thorax which are not dark) ferrugineous to light brown. Plate of abdominal tergite 1 plus hypopygium and tergites beyond 2, except on the sides, brown. Ovipositor sheaths brown. Sides of abdomen, second and third tergites (excepting a slightly browned area in the anterior central portion of tergite three), lateral thirds of tergite 4, and lateral fourths of tergite 5 contrasting yellow to yellow-testaceous. Maxillae and labium, including palpi, yellow. Legs primarily fuscous but distal portions of anterior femora, basal parts of tibiae and tarsi yellowish, and a band of proximal portions of mid and hind tibiae testaceous.

Temple: 0.7 × as wide as eye in lateral view, eyes from in front one-fourth further apart above than at narrowest part of face, slightly emarginate opposite antennal bases. Reticulation of propodeum moderately coarse, with about 3–4 hollows along a transverse line from median carina to lateral carina. Plate of tergite 1 twice as long as its apical width, rugose on posterior third and with apex curved; remaining abdominal segments polished.

Allotype: ♂, data same as on holotype. Differs from the holotype in being less dark. The scape slightly lighter in color above, the legs, including all coxae, mostly yellowish. The apical two-thirds of hind tibiae and posterior tarsi brown. Labial palpi small, their length about equal to the width of the labrum. Plate of tergite one yellowish with darkened edges. Deposited in U.S. National Museum.

Paratypes: 22 ♂♂ from the same locality. Three collected in the same week as the holotype and the other 19 taken Mar. 7–13, 1966 by Mr. Stange. In collections of Instituto Miguel Lillo at Tucuman, U.S. National Museum and the author.

Among the paratypes the color varies considerably, but the head is

always black, the mesoscutum has a distinct reddish cast and the anterior portion of the abdomen is yellowish. The coloration of the legs varies from nearly all yellow to nearly all brown. In most of the specimens the scape is ferrugineous above, contrasting with the brown in the remainder of the antenna.

Snellenius bicolor, n. sp.

Very similar to *tricolor* but differing in that the areas showing as yellowish in *tricolor* are ferrugineous (and unicolorous with the mesoscutum); the temple is as broad or broader than the eye; the labial palpus in the ♂ is distinctly longer than the labrum is wide.

Holotype: ♀, bearing the labels "Avispas, Peru IX-1962." "Collection R. D. Shenefelt." Taken by L. Peña in Malaise trap. In collection of author.

Length: Head and thorax 1.8 mm, abdomen 1.3 mm, antenna 3.4 mm, forewing 3.1 mm.

Head black. Eyes reddish. Thorax and legs ferrugineous (Maerz & Paul Plate 5 D-12). Antennae, all pretarsi, posterior tibiae and apical three-fourths of posterior femora brown. Abdomen yellow ochre (Maerz & Paul Plate 11 L-7) with the plate of tergite 1 darker and the membranous area paler than the remainder. Palpi not contrasting in color with anterior leg.

Temple and eye subequal in width when viewed from the side. Eyes above 20 units apart, separated by 17 units at the narrowest part of the face, slightly emarginate opposite antennal bases. Reticulation of propodeum coarser than in *tricolor*, with 2–3 hollows along a transverse line from median carina to lateral carina. Plate of tergite 1 twice as long as wide at apex, rugose in apical half.

Allotype: ♂, bearing the labels "Quincemil, Peru 10–15 XI-1962." "Collection R. D. Shenefelt." Taken by L: Peña in Malaise Trap. In collection of author. Agrees with the holotype in essential features. Base of scutellum and posterior edge of postnotum browned.

Paratypes: 6 ♂♂: two with same data as allotype; four from Quincemil, Peru IX-62. Two in U.S. National Museum and remainder in author's collection.

Snellenius atratus, n. sp.

Holotype: ♀, with labels "Avispas, Peru 20–30 IX-1962." "Collection of R. D. Shenefelt" on the pin. Collected by L. Peña in Malaise Trap. In collection of author.

Length: Head and thorax 1.6 mm, abdomen 1.3 mm, antenna 3.2 mm, forewing 3 mm.

Black or very dark brown except as follows: antennae brown; palpi dark tan; middle coxae, all trochanters, proximal and distal areas on anterior femora, fore and middle tarsal segments pale brown (like the palpi). Wings uniformly infuscated.

Temple smooth, ¼ broader than eye; posterior margin of eye broadly and shallowly concave when eye is viewed from side; maxillary palpus longer than

height of head, space between eyes at narrowest point of face two-thirds the distance between eyes above. Labial palpi longer than width of labrum. Penultinate segment of maxillary palpi 0.4 times length of ultimate. Areolet of forewing unusually long, narrow, nearly triangular (the second abscissa of radius and second intercubitus forming practically a straight line with first abscissa of radius and the cell about twice as long as high). Third abscissa of radius indistinct.

Mediella 13 units long, first abscissa of basella 22 and curved near base. Posterior side of cubitellan cell more than twice as long as the cell is wide at apex.

Median plate of abdominal tergite one 3⅓ times as long as wide at apex, with sharp carinae along sides on basal two-thirds, the carinae turning inwardly onto the plate near their ends and causing it to appear contracted in this area; rugose on apical third, excepting the smooth raised area at the very end. Propodeum strongly areolated with about three hollows along a transverse line between median and lateral carinae; not sharply angulate in profile. Spurs of hind tibiae ¼ as long as hind basitarsis.

Allotype: ♂, same data as associated with holotype. In collection of author. Agrees with the holotype except that second abscissa of radius and second intercubitus do not form straight line with first abscissa of radius, the areolet appearing four sided as usual. Median plate of tergite 1 nearly smooth on apical half. Mid-coxae brown on outer half and all trochanters brown. Eye relatively larger than in ♀, temple only about 1/10 wider than eye.

Paratypes: 4 ♀♀: 3 Avispas, Peru 1–15 X-1962; 1 Avispas, Peru IX-1962. One in collection of U.S. National Museum. Three in author's collection. 17 ♂♂: 2 Avispas, Peru 20–30 IX-1962; 6 Avispas, Peru 1–15 X-1962; 3 Avispas, Peru IX-1962; 3 Quincemil, Peru IX-1962; 3 Quincemil, Peru 20–30 X-1962. Two in collection of U.S. National Museum. Remainder in collection of author.

In the paratypes the coloration is very constant. The shape of the areolet varies as indicated under the notes regarding the allotype. The amount of roughness on the apical half of median plate of tergite one is variable.

Snellenius peruensis, n. sp.

Structurally very similar to *atratus* but the middle lobe of mesonotum more concave with the lateral margins raised higher and tending towards tuberculate on each side at a little behind the middle. Penultimate segment of maxillary palpi at least half as long as the ultimate. The median plate of tergite 1 with the lateral carinae extending nearly to the apex and the plate concave for most of its distance and usually with a central narrow to carinate raised area along the posterior portion just before the smooth terminal swelling. Spurs of hind tibiae relatively longer.

Holotype: ♀, with the following labels on the pin "Avispas, Peru

IX-1962" "Collection of R. D. Shenefelt." Taken by L. Peña in Malaise trap. In collection of author.

Length: Head and thorax 1.8 mm, abdomen 1.4 mm, antenna 4.0 mm, forewing 3.8 mm.

Fuscous, with the antenna beyond the scape, the distal halves of the hind tibiae and the posterior tarsi darker brown. Wings uniformly brown.

Temple smooth, narrower than eye (eye 22, temple 18) receding more strongly than in *atratus*; space between eyes above 18, at narrowest part of face 15. Flagellar segments nearly terete. Penultimate segment of maxillary palpi 9 units long, ultima 18. Areolet 0.7 as high as long along cubitus (measurements made inside of veins), four-sided, the second abscissa of radius forming a slight angle with first abscissa and a definite angle with second intercubitus. Mediella 14 units long, first abscissa of basella 25 and not so strongly bent near base as in *atratus*. Wing veins broader (heavier) than in *atratus*.

Median plate of tergite 6 wide at apex, 20 long, with side margins raised, mostly rugulose, with a high central carina located in the middle in front of a terminal smooth raised boss. Propodeum coarsely and strongly areolated with posterior and dorsal faces evident but not sharply angled in profile. Spurs of hind tibia 0.3 as long as posterior basitarsus.

Allotype: ♂, with data labels same as those on holotype. In collection of author. Agrees well with holotype. The flagellar segments approximately oval in cross section, i.e., two times as wide as deep.

Paratypes: 5 ♀ ♀: three from Avispas, Peru IX-1962; 1 from Avispas 1–15 X-1962; and one from Quincemil, Peru 10–15 XI-1962. One in collection of U.S. National Museum. Remainder in collection of author. 13 ♂ ♂: 5 from Avispas, Peru IX-1962, 2 from Avispas 20–30 XI-1962, 6 from Quincemil, Peru 10–15 XI-1962. Two in U.S. National Museum. Remainder in collection of author.

In two of the paratypes the body is much lighter brown than in the remainder but the wings and antennae are as dark as in the other specimens.

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ON THE TRUE IDENTITIES OF TUOBA AND NESOGEOPHILUS
(Chilopoda: Geophilomorpha: Geophilidae)

In his 1920 treatment of the Chilopoda of the Australian Region, Chamberlin (Bull. Mus. Comp. Zool. 64:35) described a curious new geophilomorph from the Solomons, referring it to the Gonibregmatidae, which is for many an emunctory catch-all of arcane genera, and called it *Tuoba curticeps*, new genus and species. And there it has reposed, unevoked and generically unidentifiable, for Chamberlin's delineation, published without figures, entails several crucial errors that have led subsequent workers down error's garden path.

So when in 1924 Verhoeff (Nat. Hist. Juan Fernandex 3:413) proposed within *Geophilus* a new subgenus, *Nesogeophilus*, from Juan Fernandez, he forgivably failed to identify its two species as proper congeners of the unknowable *Tuoba curticeps*. Having studied all of the pertinent types, I can assert confidently that since *laticollis* (Attems), the type-species of *Nesogeophilus* (by Attems' subsequent designation in 1929) is congeneric with *curticeps* Chamberlin, type-species of *Tuoba* (by original designation), it follows that *Nesogeophilus* 1924 is a junior subjective synonym of *Tuoba* 1920.

I imagine Chamberlin assigned *Tuoba* to the Gonibregmatidae because, as is clear from his description, he failed to discern the actual condition of the coxopleural glands, which are not manifest as freely-opening surface pores as he suggested. Rather each coxopleuron has a single large, ventral, concealed, glandular crypt that is heterogeneous, multiglandular, and multicanaliculate. A second and most distinctive feature of the genus, that no one has yet detected, is the pretarsal anterior parunguis, which is both strictly spiniform and greatly elongate, being as long as the claw proper and much longer than the minute posterior parunguis. This extraordinary condition surely seems associated with the genus' distinctively littoral preferences; it probably serves as a special hold-fast adaptation. *Tuoba* belongs where Attems and Verhoeff stationed *Nesogeophilus*, in Geophilidae.

The genus, which is predominantly littoral and world-wide, is represented in the Australian Region by the following:

curticeps Chamberlin, 1920, Solomons

hartmeyeri (Attems, 1911) (= *laticeps* q.v., part, and *sydneyensis* q.v., part. New Synonymies and Combinations, Australia)

laticeps (Pocock, 1891), New Combination, Australia

sydneyensis (Pocock, 1891), New Combination, Australia

xylophagus (Attems, 1903) (= *laticeps* q.v., New Synonymy and Combination, New Zealand).

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A NOTE ON THE IDENTITY OF HYLEMYA VARIATA (FALLÉN) AND H. VARIABILIS STEIN

(Diptera: Anthomyiidae)

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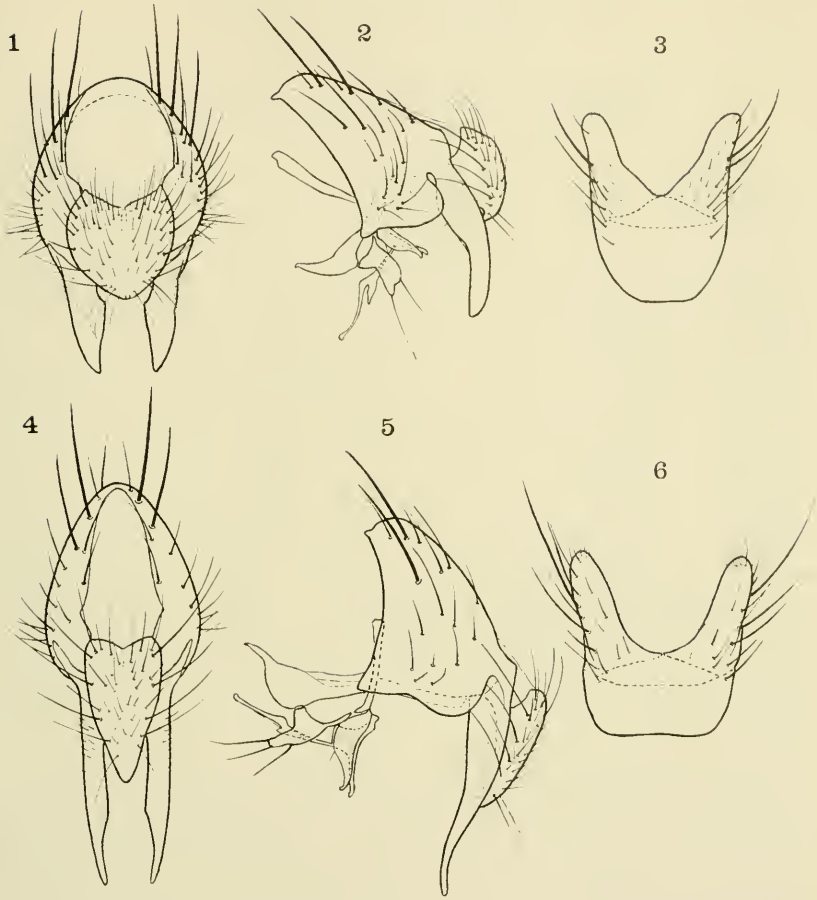
The subgenus *Hylemya* of authors has been recorded in North America as containing two species, *Hylemya alcathoe* (Walker) and *H. variata* (Fallén). Recently Ackland (1967, p. 120) has observed that the species *Hylemya variabilis* Stein (1916, p. 155), as known to him, possessed diagnostic characters comparable to those illustrated by Huckett (1924, figs. 17, 68) for *variata* in North America. His acceptance of Stein's species was conditional, provided Stein was correct in regarding *variabilis* as apart from *variata.*

Through the courtesy of Dr. Inge Persson of the Naturhistoriska Museum near Stockholm I have had the privilege and opportunity of examining the type-specimens of *Musca variata* Fallén. All such had a small red ticket with printed numbers 100 to 105 and 68 in ink respectively, and another series with numbers 493 to 496 and 67 in ink. In addition all specimens possessed a green label, on which was printed Riksmuseum, Stockholm. Of the ten specimens present I regard the four males and four females as belonging to *variata*, one female (No. 102) to *Hydrophoria ambigua* (Fallén), and one female (No. 495) to *Hydrophoria annulata* (Pandellé). I have designated the male No. 494, mounted on a coarse grayish pin, as the lectotype of *Musca variata* Fallén. The drawings of male copulatory appendages and genitalia of *variata* have been made from a male numbered 101, having a similar coarse pin. It should be noted that in this specimen one of the outer pair of parameres of the genitalia, as shown, has three filaments (fig. 5), the other having the normal two.

The chief distinctions between the species *variabilis* and *variata* may be found in the structure of male copulatory appendages. In *variata* the cercal plate or cerci is longer than wide and gonostyli slender, lengthy and curved caudad at apex when viewed laterad (figs. 4, 5) whereas in *variabilis* the cerci are as wide as long, and the gonostyli short, notched proximad and curved cephalad when viewed laterad (figs. 1, 2). A single comparison of the ovipositor failed to indicate any notable differences between the two species.

I have yet to recognize *variata* (Fallén) as occurring in North America, examination having been made of males from Alaska, Yukon Territory, British Columbia, Manitoba, Ontario, Quebec, New York, Iowa and California. The character of the copulatory appendages exhibited by these specimens all served to confirm Stein's concept of *variabilis* as apart from *variata.* It would appear that previous records of *H. variata* from North America are actually based upon misidentified



Figs. 1–6, copulatory appendages and genitalia, ♂♂: 1–3, *Hylemya variabilis* Stein; 4–6, *H. variata* (Fallén).

specimens of *H. variabilis*, which is here recorded from North America for the first time.

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THE PANAMANIAN ATTA SPECIES
(HYMENOPTERA: FORMICIDAE)

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Three species of *Atta* are known from the Republic of Panama, including the Panama Canal Zone area (Weber, 1956). The present note illustrates these for the first time. One has become of particular interest in view of the biochemical studies of Martin *et al.* (1967 and manuscript) and all have been used by me in various published and unpublished biological studies. All have been maintained in my laboratory and 1966 colonies of two are currently thriving.

Of the three, *Atta sexdens* (L.) is widespread in South America and extends into Costa Rica. The common *Atta cephalotes* (L.) of South America is represented in Panama by the subspecies *isthmicola* Weber, and perhaps undescribed subspecies are found in Costa Rica and elsewhere in Central America. The distribution of *sexdens* and *cephalotes* in South America is figured in Weber, 1966. A narrow, isolated coastal strip in the state of Bahia, Brasil, that was inadvertently omitted from the *cephalotes* map was kindly called to my attention by Dr. Pedrito Silva. The distribution of the third, *Atta colombica tonsipes* Santschi, is Panamanian only, so far as known. The identification is based on the Santschi type material, which I have studied (Weber, 1958). It comes from two Panamanian localities where this ant still occurs.

The three may be distinguished from one another as follows:

1. Head of soldier relatively smooth and shiny on the occiput; workers smooth and shiny, clearly bi-colored, the thorax darker than the head ..... **cephalotes isthmicola** Weber
   Head of soldier matte; workers uniformly colored 2
2. No pre-occipital spine or tubercle in soldier or worker; mostly a species of forest ..... **colombica tonsipes** Santschi
   Pre-occipital spine or tubercle in soldier and worker; grasslands or grassland-forest margin ecotone ..... **sexdens** (L.)

Of the three, *sexdens* has the smallest male but all have large females. The weights in life of representative soldiers were 67–103 milligrams (mature *isthmicola* colony), 27–35 mg (*tonsipes* of 1½ year colony) and 23–64 mg (young *sexdens* colony). It appears that it takes more than two or three years to produce the largest soldier in *tonsipes* and a shorter period in the other two. Small soldiers are produced in all three in the second half of the first year of colony life. In young colonies the species may be easily distinguished by the smooth and shiny workers in *isthmicola* contrasted with the matte workers of the other two and the pre-occipital tubercle in *sexdens* being absent in *tonsipes*.

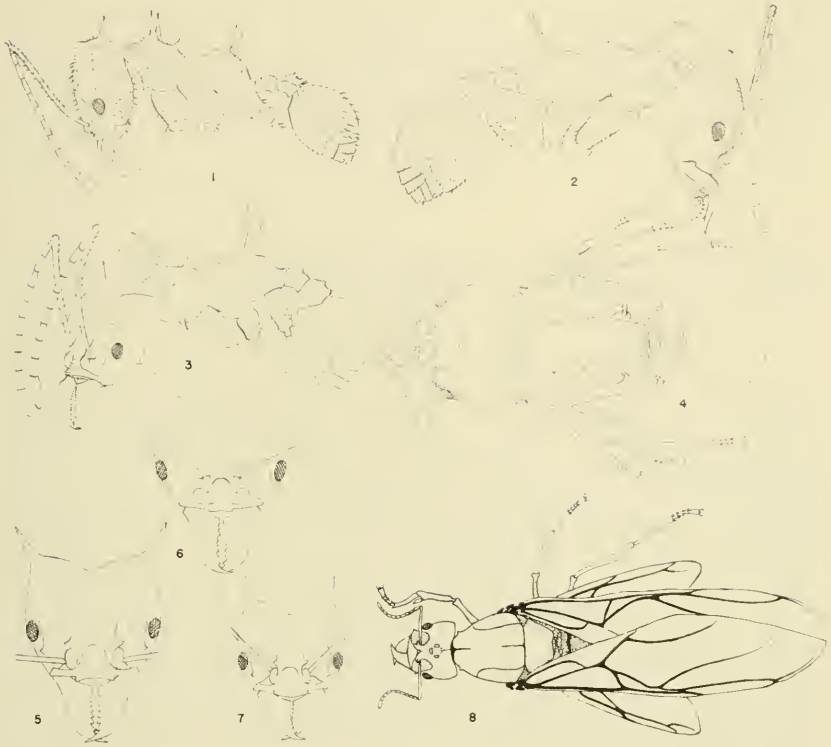

Fig. 1, *Atta sexdens* (L.) worker, Panama. Figs. 2, 5–8, *A. colombica tonsipes* Santschi: 2, thorax length 2.70 mm, width of head 2.18 mm; 5, worker head width 2.25 mm, back of eyes, 1.80 mm from clypeal margin to mid-occipital impression; 6, worker head width 3.40 mm and length as above 2.40 mm; 7, worker head 1.60 mm and 1.50 mm; 8, alate female from above. Figs. 3 and 4, *A. cephalotes isthmicola* Weber: 3, cotype worker, thorax 2.70 mm, width of head 2.18 mm, ant size identical to *tonsipes* above, Canal Zone; 4, soldier, dorsal view, Canal Zone.

Acknowledgments

David Klingener kindly determined the distribution of *tonsipes* in the Canal Zone for me in 1957 and Suzanne Tubby (now Dr. S. T. Batra) made the drawings. Aided by NSF Grant GB5346.

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STUDIES ON CALIFORNIA ANTS. 4. TWO SPECIES OF CAMPONOTUS (HYMENOPTERA: FORMICIDAE)

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Prior to the work of Creighton (1950) the genus *Camponotus* Mayr had assigned to it approximately 60 names for various components of the Nearctic fauna. Creighton attacked the problems posed by this superabundance of names and reduced them to 48. Since then little has been done: three new species have been described (Creighton, 1952, 1965; Smith, 1953), two have been redescribed (Creighton, 1965; Creighton and Snelling, 1966), one has been excluded from the Nearctic fauna (Creighton, 1952) and one subspecies has been transferred from one species to another and back again (Brown, 1950; Gregg, 1963). While studying the ants of California and Baja California, Mexico, I became convinced that still further changes are in order. Two of the necessary changes affecting the species of California are proposed here.

A large part of the material on which this study is based is in the collections of the Los Angeles County Museum of Natural History. An important collection from Baja California has been made available through the courtesy of E. L. Sleeper and E. M. Fisher, Long Beach State College, Long Beach, California. Other material, including important type specimens, was studied at the United States National Museum through the kindness of D. R. Smith. In several conversations I have had the benefit of the extensive experience of W. S. Creighton and M. R. Smith has made available for reference an unfinished manuscript revision of the subgenus *Myrmentoma* Forel. To each of these gentlemen my very sincere thanks for their cooperation. The figures for this paper were prepared by Ruth A. DeNicola to whom I remain grateful.

Camponotus (Tanaemyrmex) festinatus (Buckley), new status

Formica festinata Buckley, 1866, Proc. Ent. Soc. Phila. 6:164. ☿ ♀.
Camponotus (Camponotus) fumidus pubicornis Emery, 1894, Zool. Jahrb., Abt. f. System. 7:668, 670. ☿.

Camponotus fragilis Pergande, 1894, Proc. Calif. Acad. Sci. 4:26. ☿.
Camponotus fumidus var. *festinatus*: Wheeler, 1902, Trans. Texas Acad. Sci. 4:22. ☿. Wheeler, 1910. Ann. N. Y. Acad. Sci. 20:312–314.
Camponotus fumidus var. *fragilis*: Emery, 1895, Zool. Jahrb., Abt. f. System. 8:336. ☿. Wheeler, 1910, Ann. N. Y. Acad. Sci. 20: 315. ☿.
Camponotus fumidus var. *spurcus* Wheeler, 1910, Ann. N. Y. Acad. Sci. 20:315. ☿ ♀.
Camponotus fumidus subsp. *festinatus*: Creighton, 1950, Bull. Mus. Comp. Zool. 104:376.

Although this ant has traditionally been considered a form of *C. fumidus* Roger I have departed from this treatment. Roger (1863) described his species from a major worker from an unspecified locality in Venezuela. While the original description is not completely adequate by current standards, one significant characteristic was described; Roger stated quite clearly that the scapes and tibiae of *C. fumidus* were without erect hairs (". . . fehlt am Scapus und an den Schienen."). Since a number of so-called subspecies have been assigned to *C. fumidus* which possess abundant erect hairs on the scapes and tibiae I have examined them and find that they differ specifically from one another and therefore, presumably, from *C. fumidus* as well.

I have not seen true *C. fumidus*; the few specimens available to me under this name do not agree with the original description and I see no reason to consider them the same as Roger's ant. All material which I have seen from Mexico and the United States has been assigned to *C. festinatus.* While there is a considerable amount of variation in these samples, they consistently possess erect hairs on the scapes and tibiae.

Of the several forms currently assigned to *C. fumidus*, *C. f. pubicornis*, *C. fragilis* and *C. f. spurca* may be disregarded as outright synonyms of *C. festinatus*, as shown by Creighton (1950). Two West Indian forms, *C. f. vittata* Forel and *C. f. lucayana* Wheeler, are deserving of consideration, since they bear somewhat on the status of our mainland form. Of *C. f. vittata* I have seen a few workers and majors and a single female from Brazil and a long series of workers and majors from the island of Dominica. Of *C. f. lucayana* I have seen several series, including all castes, from the Bimini Islands. These, together with *C. festinatus*, form a distinct group but each apparently should stand as a separate species.

All agree in possessing erect hairs on the scapes and tibiae as well as on the cheeks. Although there is conspicuous variation in the color of these ants they offer an undeniable basic similarity. Basically the integument is pale yellow but it tends to be overlain by a distinct brownish infuscation, especially on the occipital region, the thoracic dorsum and on the gaster. In its greatest development (most material

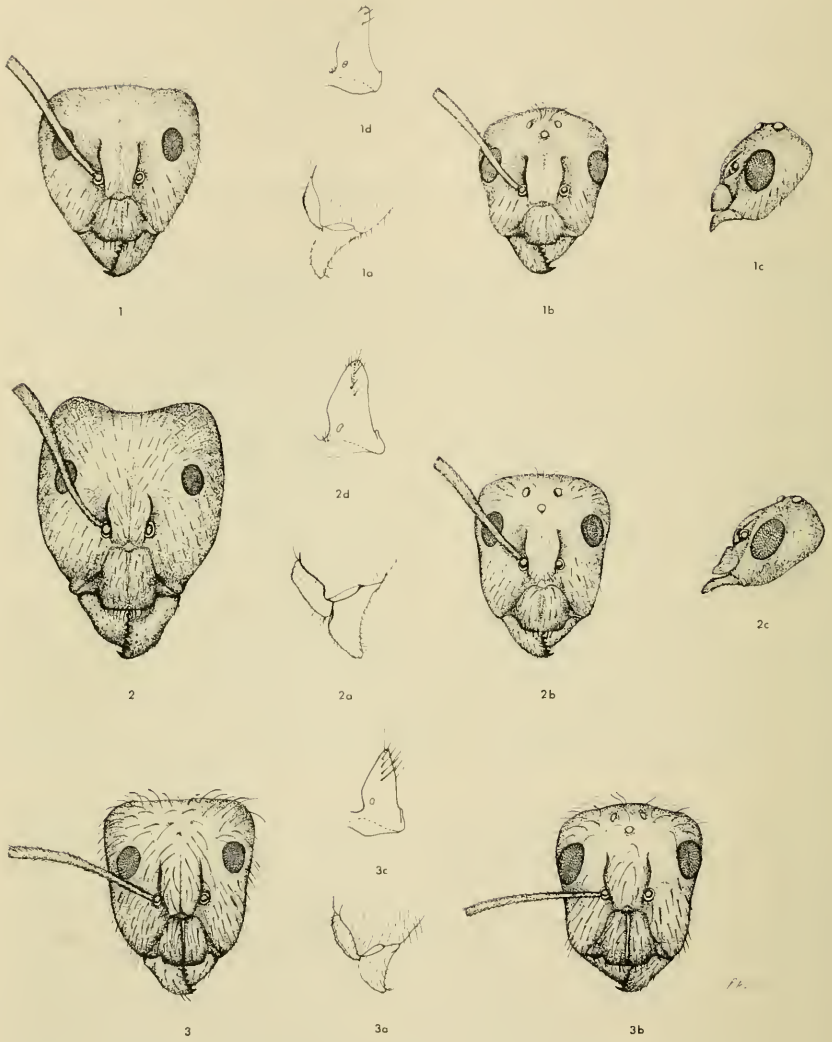


Fig. 1, *Camponotus festinatus* (Buckley), major worker, head, frontal view; 1a, major worker, lower half of head, lateral view; 1b, female, head, frontal view; 1c, male, head, lateral view; 1d, female, petiolar scale, lateral view. Fig. 2, *Camponotus lucayanus* Wheeler, same. Fig. 3, *Camponotus vittatus* Forel, a, b, same; 3c, female, petiolar scale, lateral view.

of *C. vittatus*) the yellow is almost completely obscured except for lateral spots on the gastric segments. The same pattern is present, too, in infuscated individuals of *C. lucayanus* and *C. festinatus* but not as well developed though occasional specimens show lateral spots.

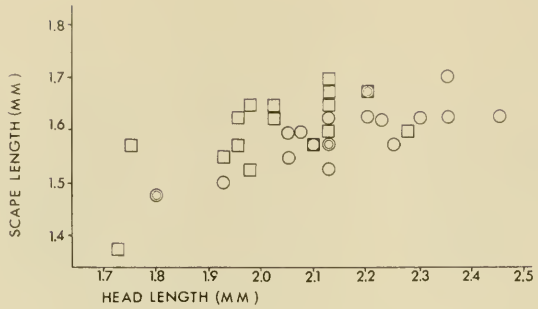
All three species have the apico-median portion of the clypeus slightly prolonged, with its margin transverse. A median longitudinal carina is present, but the extent of its development varies from one species to the next. In *C. vittatus* (fig. 3a) the carina is high and sharp and extends the entire length of the clypeus in the workers and females. In *C. lucayanus* (fig. 2a) and *C. festinatus* (fig. 1a) the carina is much lower and rounded; indeed, it is hardly more than a median angulation of the clypeal disc. In these species, also, the carina extends only about two-thirds the length of the clypeus. In profile, the carina in *C. lucayanus* is relatively flat in the apical three-fourths and slopes abruptly in the basal one-fourth to the basal clypeal suture. By contrast, that of *C. festinatus* presents a low contour which is evenly rounded; rarely is it slightly angled at the basal one-fourth.

The above considerations apply to the workers, both major and minor, and to the females. Males of *C. vittatus* have not been available, but I have seen numerous males of *C. lucayanus* and *C. festinatus*. The profile of the clypeus is dramatically different. In *C. lucayanus* (fig. 2c) the clypeus is either flat or with an angular transverse impression in the middle; the basal one-fifth falls steeply, sometimes vertically, to the basal suture. No such condition exists in *C. festinatus* males. In these the clypeal profile may be slightly convex, a little more rounded toward the base, or with a transverse median impression. But, in all specimens seen by me, the basal portion is evenly rounded toward the basal suture (fig. 1b).

The major workers of *C. lucayanus* have a slightly shorter scape than do those of the other species, exceeding the occipital corners by about the length of the first funicular segment. In *C. festinatus* and *C. vittatus* the scapes extend beyond the occipital corners by a distance nearly equal to the combined lengths of the first two funicular segments.

The shape of the head, in full face view, differs among the three species. In *C. vittatus* the head of the majors is relatively longer and the convergence of the lateral margins below is more pronounced (fig. 3). In the minor workers of *C. festinatus* and *C. lucayanus* the margins of the head, below the level of the eyes, are parallel or slightly narrowed toward the mandibular insertions, while in *C. vittatus* the sides of the head are divergent below; i.e., the head is a little broader at the level of the mandibular insertions than at the level of the lower margins of the eyes.

The shape of the head of the females differs but the differences are slight. That of *C. vittatus* (fig. 3b) is distinctly sinuate in full face view, the face being narrowed slightly below the level of the eyes. This, however, is based upon a single specimen and I believe it may not prove consistent, since I have seen a few females of *C. festinatus* with



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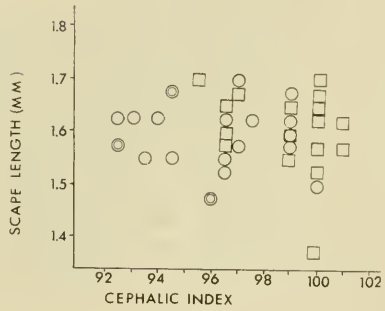

◎- C. sayi - cotypes
○- C. sayi - western
□- C. sayi - eastern

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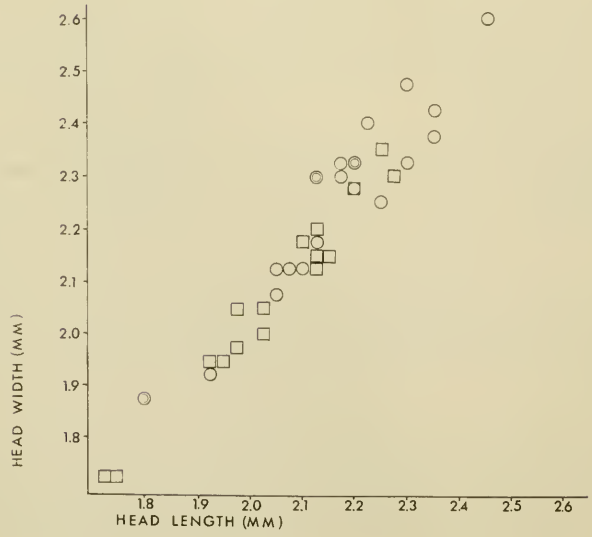

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an indication of a similar narrowing. The head is longest and narrowest in *C. vittatus*, shortest and broadest in *C. festinatus*.

The erect cephalic hairs differ and in this, also, *C. vittatus* is most distinctive. In both *C. festinatus* and *C. lucayanus* the longest hairs are shorter than the maximum diameter of the eyes, while in *C. vittatus* these hairs are distinctly longer. The latter species also has a greater number of erect hairs as indicated in the figures.

Finally, the shape of the petiolar scale differs. In *C. lucayanus* and *C. festinatus* the scale is variable in profile, but it is usually blunt above, with the summit rather evenly rounded (figs. 1d, 2d). The scale of *C. vittatus* (fig. 3c) is distinctly cuneate in profile, the apex strongly narrowed and angular.

There is no evidence that these forms are sympatric with one another and hence there is no opportunity for the intergrades one would expect if they were subspecies of a single polytypic species. This, of course, does not rule out the possibility that they may actually be subspecies, but I am convinced that the morphological evidence is against such an interpretation. That any of these could be subspecies of *C. fumidus*, which lacks the erect hairs so conspicuous on the scapes and tibiae of the other three, I seriously doubt. The southernmost of the three species, *C. vittatus*, is typically the most hirsute; specimens of *C. festinatus* from the southern parts of its range exhibit an increase in the density of erect hairs present. This seems to be precisely the opposite of what should be expected if this ant is, in fact, a subspecies of the Venezuelan *C. fumidus*. It seems more reasonable to accord this ant specific status until conclusive evidence to the contrary is forthcoming.

Camponotus (Myrmentoma) sayi Emery

Camponotus sayi Emery, 1894, Zool. Jahrb., Abt. f. System. 7:679. ☿. Wheeler, 1910, Ann. N. Y. Acad. Sci. 20:343. ☿.

Camponotus sayi var. *bicolor* Pergande, 1894, Proc. Calif. Acad. Sci. 4:161. ☿ ♀ ♂. Preocc.

Camponotus fallax subsp. *rasilis* Wheeler, 1910, Jour. N. Y. Ent. Soc. 18:227. ☿ ♀ ♂. **New synonym.**

Camponotus sayi californica Emery, 1925, *in* Wytsman, Gen. Insect. 183:118. New name for *C. sayi bicolor* Pergande. **New synonym.**

Camponotus (*Myrmentoma*) *rasilis*: Creighton, 1950, Bull. Mus. Comp. Zool. 104:389. Gregg, 1963. Univ. Colo. Press, Boulder, pp. 677–678.

Camponotus (*Myrmentoma*) *sayi*: Creighton, 1950, Bull. Mus. Comp. Zool. 104:390.

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Fig. 4. Head length-scape length relationships in *Camponotus sayi* Emery major workers. Fig. 5, Cephalic index-scape length relationships in *C. sayi*. Fig. 6, Head length-head width relationships in populations of *C. sayi* major workers.

Camponotus sayi was described by Emery from a limited series of specimens taken at Phoenix, Arizona. These ants were sent to him by Pergande who, typically, retained a portion for his own collection. Six specimens of this series (three major and three minor workers), marked as cotypes, are in the collections of the United States National Museum. These specimens, plus the cotypes of *C. sayi bicolor*, are the basis for the discussion which follows.

Emery's original description, while brief, is straightforward and contains sufficient information to permit recognition of the species. At this time the ant was compared to *C. marginatus discolor* (i.e., *C. caryae discolor*), but was noted to differ in the lack of foveiform punctures on the cheeks. Pergande described *C. sayi bicolor* from a long series of workers, two females and three males from Chuparosa in the Sierra Laguna and San Jose del Cabo, Baja California, Mexico. The name chosen by Pergande was preoccupied and Emery renamed it *C. sayi californicus* in 1925. Pergande characterized his ant as being distinctly larger than *C. sayi* from Arizona (of which he had part of the original series) but I do not think this is important since size is a notoriously poor character in this genus.

Wheeler (1910a) described *C. fallax rasilis* from material taken in Texas, Arizona, Louisiana and Florida. The original description was so vague that any small *Camponotus* with reddish head and thorax and nonpilose cheeks could be assigned to it. The key provided by Wheeler was no better since separation of the various forms depended on color and "average size." In the same year Wheeler published a second paper (1910b) on *Camponotus*. Here, *C. fallax rasilis* was merely listed, while *C. sayi* was redescribed, evidently from a few cotypes and a few strays taken by Wheeler at Phoenix (the type locality of *C. sayi*) and at Prescott, Arizona. Wheeler's redescription of *C. sayi* was reasonably detailed, but in the case of the major workers, it was evidently based upon maximum-sized individuals representing the ideal condition. Further commentary was provided: "This species, as Emery has remarked, is very similar to *C. fallax discolor*. It is even more like *fallax rasilis*, but the head and thorax are more robust, the head is more excised behind, the clypeal notch is smaller, the epinotum more angular and the sculpture is different, the punctures on the sides and front of the head being much smaller and the surface of the head and thorax somewhat more shining. These differences are not very pronounced and it may be necessary, when *sayi* is better known, to reduce it to the rank of a subspecies of *fallax*." Another key was given; this key included *C. sayi*, not included in the earlier paper. Here, *C. sayi* was separated from *C. fallax* forms by its larger, broader head and the non-pubescent gaster.

Creighton (1950) used a different method for separating *C. sayi* from *C. rasilis* (elevated there to specific rank). He utilized the

relatively shorter scape of *C. sayi,* said to fall short of the occipital corners. In *C. rasilis* the scape was said to extend beyond the occipital corners by at least the apical breadth of the scape.

Since one of the cotype majors of *C. sayi* has the scape extending beyond the occipital corners, a character seen also is some cotypes of *C. sayi bicolor,* it seemed prudent to investigate this character in detail. All available cotype majors of *C. sayi* and *C. sayi bicolor* were measured for head length and scape length. Similar measurements were made on randomly selected majors of *C. rasilis* from Mississippi, Georgia, Texas and Oklahoma. The results are shown in fig. 4. It is evident that a poorly defined regression zone exists and that there is a tendency for the eastern populations to exhibit a relatively longer scape. However, it is equally obvious that there is a broad overlap in scape length. Interestingly, the cotypes of *C. sayi* fall very clearly in the median area. Since these data suggest at least a partial differentiation I next attempted to correlate scape length with the cephalic index (HL ÷ HW × 100), the results of which are shown in fig. 5. Finally, the relationship of head length to head width is shown in fig. 6. These data confirm those indicated in fig. 4, that differentiation does exist but that it is neither significant nor consistent. On the basis of cephalic characters, it is clear that neither *C. sayi bicolor* = *californicus* nor *C. rasilis* is worthy of separation.

I believe that all the differences cited to separate these forms are the results of allometry; relative scape length decreases, cephalic punctures become finer and sparser, the occipital excision becomes more pronounced, integument becomes shinier, angles become more exaggerated, with the increase in size. The only difference left is that of the supposedly non-pubescent gaster of *C. sayi* versus the condition of *C. rasilis* in which there are evident scattered fine appressed hairs. These hairs are present in *C. sayi,* but least evident in the largest specimens. This is due, I think, not to a reduction in the number of such hairs, but rather to the more shining integument of these individuals. These hairs are obvious in *C. rasilis* and small specimens of *C. sayi* because they reflect light and hence are more apparent against the duller integument. But, in the case of specimens with a nearly polished integument, the entire surface is highly reflective and these fine, appressed hairs are merely more difficult to perceive.

Because the differences which purportedly separate *C. sayi* from *C. rasilis* are correlated with allometric growth I see nothing to be gained by the continued separation of these insects. It should be further clear that, while the eastern and western populations tend to exhibit some differences, these are slight and of little practical value. The populations from Texas eastward appear to be more constant in their characters and the maximum head length of the majors is a little less than is true of the western populations (fig. 4). Coupled

with this smaller size is a relatively longer antennal scape and a slightly duller integument (especially on the head). The western populations are highly plastic (perhaps in response to greater variation in habitats and climate) and individuals within a single colony sample may possess either a long or short scape, or one of intermediate length.

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THE MAYFLY GENUS HEXAGENIA IN MEXICO
(EPHEMEROPTERA: EPHEMERIDAE)

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All reported records of the genus *Hexagenia* Walsh in Mexico, Central and South America are of species of the subgenus *Pseudeatonica* Spieth, while those species known from America north of Mexico are all of the subgenus *Hexagenia* s.s. During the course of a generic study of the family Ephemeridae, specimens of *Hexagenia* (*Hexagenia*) *bilineata* (Say) and *H.* (*H.*) *limbata* (Serville) from Mexico have been studied as follows:

H. bilineata: El Banito Valles, San Louis Potosi, June 26, 1940, H. Hoogstraal and K. Knight, 1 male imago in the collection of the University of Utah.

H. limbata: Ajijic, Lake Chapala, Jalisco, August 23, 27, 28, 1966, Marion E.

Smith, 2 males and 1 female imago in the collection of the University of Utah; Rio Guayalejo, Tamaulipas Province, December 22, 1939, Lewis Berner, 8 immature nymphs in the collection of Jay R. Traver.

The above records represent a considerable extension of the reported range of both these species (see Spieth, 1941; Hamilton, 1959), yet the distributional extension appears to follow the pattern of many species. Spieth (loc. cit.) indicates localities in Texas where both species have been taken and also cites a New Mexico record for *H. bilineata*. *H. limbata* is also reported from Colorado, Utah, and California.

Type material of *Hexagenia* (*Pseudeatonica*) *mexicana* Eaton were the only specimens of the genus previously reported to occur in Mexico, and Eaton (1883–1888) cites only "Mexico" as the type locality for this species. It is probable that *H.* (*P.*) *mexicana* is restricted to the Neotropical regions of Mexico and that there is a natural geographic separation of the respective subgenera. Additional collecting in both Mexico and Central America is needed before our understanding of this distributional problem is complete.

It is of interest here to note that Kimmins (1960) regards *Pseudeatonica* as a full genus. This may well be the case; however, since the nymphs of *Pseudeatonica* are unknown at the present time, it remains a question as to which ranking of the taxon is correct. Edmunds and Allen (1966) have pointed out the importance of knowing the nymphal stage of mayflies before a proper classificatory arrangement can be constructed. Undoubtedly the nymphs, when known, will help clarify the status of *Pseudeatonica*.

I would like to thank Dr. George F. Edmunds, Jr., Dr. Marion E. Smith and Dr. Jay R. Traver for supplying specimens collected in Mexico.

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A CASE OF PARTIALLY REDUPLICATED ANTENNA IN MINETTIA OBSCURA (LOEW)

(DIPTERA: LAUXANIIDAE)

A male specimen of *Minettia obscura* (Loew), taken on low vegetation along Cabin John Creek west of Bethesda, Maryland, on 27 May 1968, along with many *M. lyraformis* Shewell and a few *M. americana* Malloch, *M. lobata* Shewell, and other *M. obscura*, was seen to have an abnormal right antenna, as shown in the accompanying figure. The left antenna is normal, as apparently is the rest of the specimen.

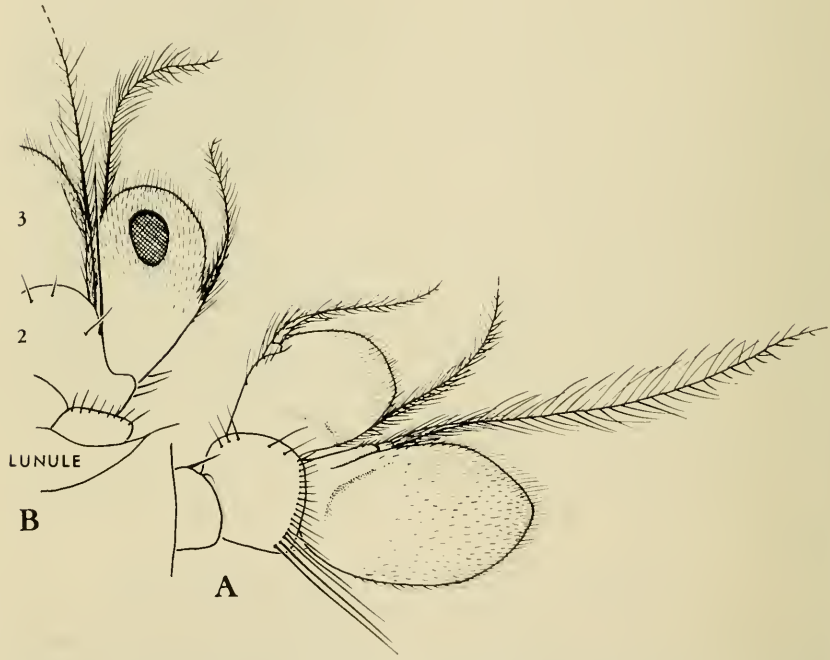

Fig. 1. Teratological right antenna of *Minettia obscura* (Lw.); A—profile; B—dorsomesal view of portion not obscured by left antenna (2, 3—segments 2 and 3 resp. of basic part of antenna).

The teratological antenna consists of a normal first segment, a dorsoventrally broadened second segment, and an extra third segment bearing an extra arista apparently proceeding from a groove in the lower side of the extra third segment. The lower, more normal third segment differs from that of its mate only in slightly different outline, being slightly broader and more angulate apically. The extra third segment bears on its mesal side a deep oval pit.

The specimen has been deposited in the collections of the United States National Museum.—GEORGE C. STEYSKAL, *Systematic Entomology Laboratory, Entomology Research Division, ARS, USDA, c/o U. S. National Museum, Washington, D. C. 20560.*

THREE NEW SPECIES OF THE GENUS TRIPTEROIDES, SUBGENUS TRIPTEROIDES GILES[1, 2]

(DIPTERA: CULICIDAE)

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INTRODUCTION

The subgenus *Tripteroides* of the genus *Tripteroides* Giles is a complex group of about 50 species occurring from India and Ceylon, through Thailand and Viet-Nam, north to China, Taiwan and Japan, and south through the Philippines, Malaysia, Indonesia, New Guinea, the Solomon Islands, and Australia. Pending a revision of the subgenus we are describing three new species from Malaya and Thailand. We feel that these species draw attention to certain diagnostic characters in this subgenus.

We are following the classification proposed by Belkin (1962) who recognized three subgenera as follows: "*Tripteroides* for the ornamented species, *Rachisoura* for nonornamented species with predaceous larvae with incomplete, widely separated maxillary sutures, and *Rachionotomyia* for all the other nonornamented species." The larval and pupal chaetotaxy and terminology used is also that of Belkin (1962) for the most part. Following Knight (1968), we are labeling the larval basal maxillary hair "bmh," having found it to be of some taxonomic value.

Type specimens will be deposited in the U.S. National Museum, Washington, D.C., and the British Museum (Natural History), London.

Many of the *Tripteroides* (*Tripteroides*) species are difficult or impossible to separate using adult coloration and scaling alone. The species usually have brilliant blue scales on the vertex; silver patches on pleuron, abdomen, and femora; narrow dark scales on scutum; broad black scales on scutellum and anterior pronotum and narrow ones on scutum and posterior pronotum. Color of scutellar and pleural integument is somewhat variable, though in a few species it seems constant enough to be helpful. Differences between some species may be noted in the extent of silver pleural scaling, the shape and extent of silver abdominal patches, and differences from the norm described above; however, in some species these characters tend to be somewhat variable also. A good many of the members of this subgenus characteristically have rows of long scales and diagonally striated setae at the apex of the

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[2] Immediate publication secured by full payment of page charges.—Editor.

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male hind tibia and base of hind first tarsomere; additional specialized scaling of the male legs as well as claw structures present valuable specific characters. The female terminalia have not provided useful characters for other workers and have not been used here. Male terminalia in some cases look similar superficially but on closer examination show good characters. The ninth tergum, distimere, and paraproct have traditionally been used, but we found Baisas and Ubaldo-Pagayon's method (1953) of dissecting the aedeagus and studying it from lateral as well as dorsal views especially productive. The ventral projection of the aedeagus (Baisas calls it the ventral arm) can be seen clearly only in lateral aspect. Lien (1958, p. 15) illustrates his new *Tripteroides* (*T.*) *cheni* in lateral view to differentiate it from *bambusa* (Yamada), but few other authors have given illustrated descriptions of this structure.

In the immatures there are many similarities among species and much specific variation. In pupae the length and character of abdominal hairs 3-VII and 5-II-VI are sometimes useful. Paddle shape and size and the location of paddle spicules, when present, may prove to be valuable characters. Because there are no striking differences among the pupae of the present species, they are not described in detail, and only *tarsalis*, n. sp. as a whole and paddles of *malayi*, n. sp. and *denticulatus*, n. sp. are figured. Larval differences may be found in the basal maxillary hair (bmh), 14-C, possibly other head hairs, and, most useful, segment VIII, siphon, and anal segment. Larvae of the Southeast Asian species have mesothoracic tubercles protruding to a small point but never with a long pointed lobe which is present in some species from New Guinea, Solomon Islands, and Fiji [*bimaculipes* (Theobald), *binotatus* Belkin, *brevipalpus* Brug, *distigma* (Edwards), *lipovski* Belkin, *purpuratus* (Edwards), and *quasiornatus* (Taylor)].

The three species that we are describing have an aedeagal type which generally resembles that of *bambusa* from Japan, Taiwan, China, Ryukyu-Retto and *vicinus* (Edwards) from Borneo, Malaya, China, Sumatra in having dorsal teeth and twin ventral projections, each of which has an anterior hump, sometimes faintly sclerotized, immediately sternad of the main aedeagal tube. The descriptions are mainly based on the holotypes, but the extent of variation in all the specimens which were available for examination is noted.

Tripteroides (Tripteroides) denticulatus, n. sp.
(Figs. 1, 4, 5)

MALE. *Head.* Vertex with bright blue decumbent scales; lateral surface with silvery scales; occiput with erect dark brown scales; torus bare, yellowish or whitish-brown; clypeus bare, pale brown; proboscis about 1.5 longer than fore femur, underside of base of proboscis with a number of dark bristles; palpi uniformly dark, about 0.1 length of proboscis. *Thorax.* Scutal integument brown, darker at dorso-

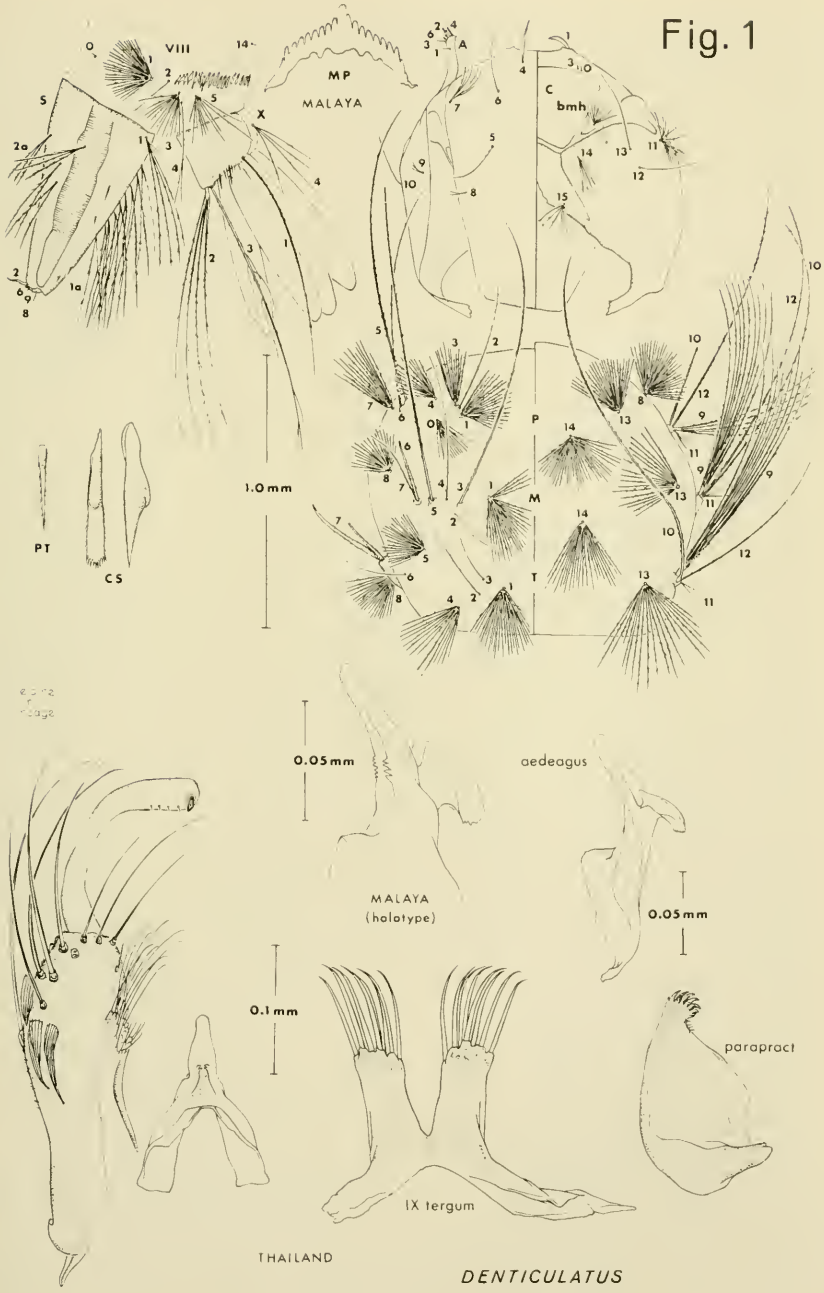


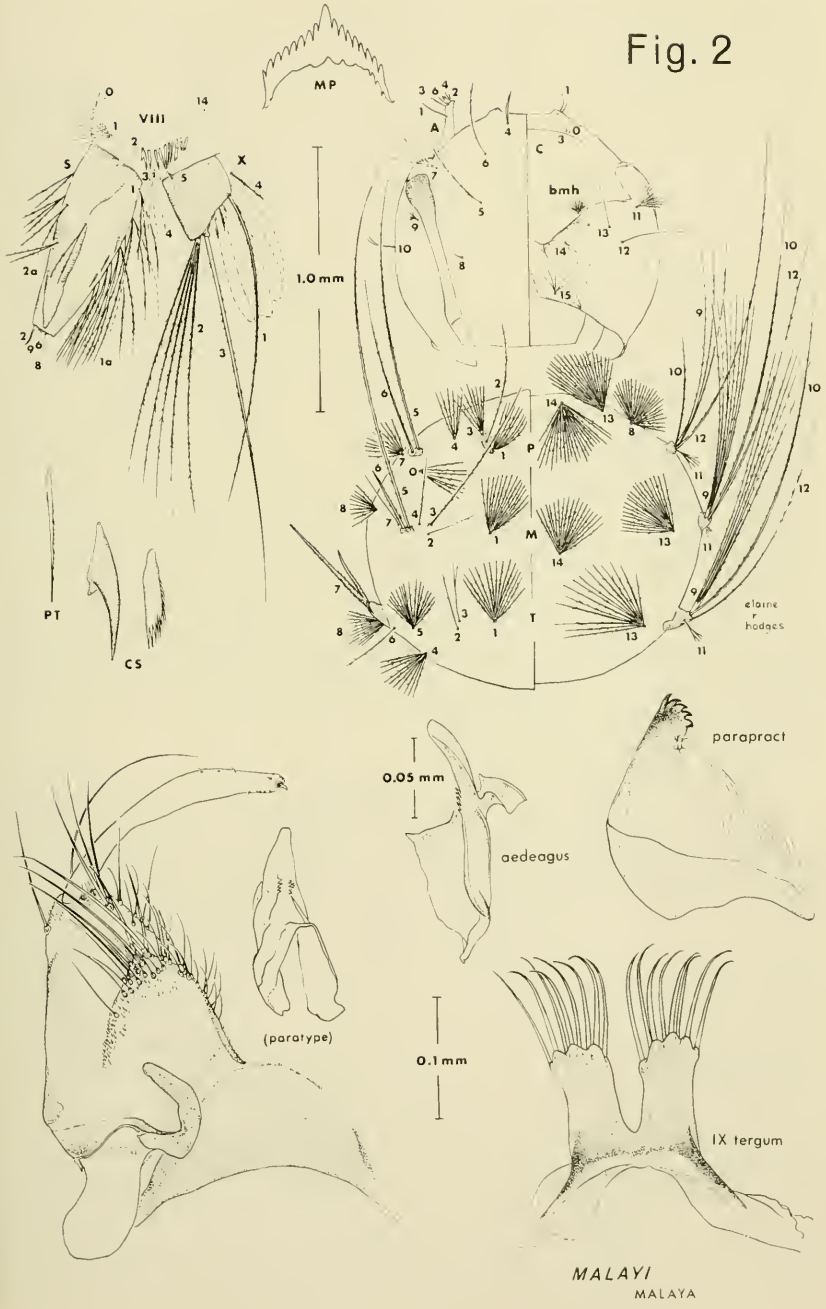
Fig. 1
MP
MALAYA
VIII
X
A
C
bmh
P
M
T
PT
CS
1.0mm
0.05mm
MALAYA
(holotype)
aedeagus
0.05mm
0.1mm
paraproct
IX tergum
THAILAND
DENTICULATUS

central portion, yellowish around anterior promontory, humeral and supraalar areas, with dark brown narrow scales and bristles; yellowish or beige prescutellar space and scutellum, the latter with broad dark brown or black scales; anterior pronotum yellowish with broad dark brown scales and a number of strong bristles, posterior pronotum yellowish with narrow dark brown scales interspersed with a few broader ones, with 1 dark bristle; propleuron yellowish with 2 bristles; pleuron medium brown on postspiracular and spiracular areas, sternopleuron, paratergite and mesepimeron; meron and sometimes paratergite pale brown; sternopleuron with silvery broad appressed scales from below prealar to above mid coxa; a patch of translucent silvery scales on mesepimeron. *Legs.* Silvery scales on coxae; anterior surface of each femur with a silver line extending from base to one-third and 2 silver spots, 1 median and 1 subapical (not well defined on the fore femur of the holotype); legs otherwise dark anteriorly; dorsal edge of fore tibia with an inwardly inclined row of 14–18 more or less regularly spaced stiff, long semi-erect spines, each of these spines, on the whole, longer than the diameter of the tibia. Fore tarsomere V modified; a paratype slide preparation shows the plantar surface with 2 stout, sharply pointed basal spines mounted on tubercles plus 4 other tubercles each bearing a small seta (as in *malayi*, fig. 4). Mid tarsomere V unmodified. Hind leg with a group of long semi-erect setae and scales at apex of tibia and base of tarsomere I (fig. 4); these scales and setae are shown enlarged, setae with diagonal striations and scales with a central rib resembling a long narrow feather; tarsomere V unmodified. *Claws.* (Fig. 4, drawn from paratype). Fore tarsal claws unequal, the larger claw with a strong median tooth projecting at about right angles to it; mid claws small, simple and equal; hind claws very small, simple and equal. *Abdomen.* Terga dark dorsally, with distinct postero-lateral patches of silvery-white scales on II-VII (patches larger on II and VII); I and VIII entirely dark. Abdominal maculation is generally similar to *tarsalis* (fig. 4) though lateral patches tend to be smaller in *denticulatus*; sterna pale gold. *Terminalia.* (Fig. 1, drawn from holotype and 2 Thailand paratypes). Basimere with long bristles on lateral distal margin; basal lobe with about 10 long and some short bristles; distimere incurved, attenuated at middle, with a few fine setae distally and an apical flattened spiniform appendage; aedeagus tapered distally with a variable number of strong middorsal teeth (4–10) and a ventral projection serrated finely on distal margin; paramere outwardly curved; paraproct with 6–8 teeth and 4–8 cercal setae; tergum IX with 6–9 apical bristles of equal length on each lobe. The aedeagus of the paratype shown in lateral view appears to differ slightly from that of the holotype. At this stage we feel that these differences are not of specific value, though this might prove to be so when more material is available for examination.

PUPA. (Fig. 5, paddle drawn from holotype, 4 specimens examined.) Hair 3-VII reaching to or beyond posterior margin of VIII; paddles 1.5–2.0 times as long as wide, smooth and rounded apically, without spicules. Except for paddles, pupa resembles *tarsalis* as illustrated.

LARVA. (Fig. 1, drawn from paratype, 4 specimens examined.) *Head.* 4-C single, long, flattened and expanded at middle, tapering to a fine point; 7-C about as long as 4-C, 5–7 branched; 8-C normally with 2 weak branches (1–3); 9-C with 2–6 short, weak branches; mental plate (MP) with 17–19 teeth; strong basal maxillary hair (bmh) varying in size from much smaller to as large or larger than 14-C, usually with 3–11 branches; 14-C usually with 5 or fewer branches, about ⅔ length

Fig. 2


MP
VIII
S
X
PT
CS
1.0 mm
A
C
bmh
P
M
T
claire
r
hodges
0.05 mm
aedeagus
paraproct
(paratype)
0.1 mm
IX tergum
MALAYI
MALAYA

of antenna; 15-C usually with 5–6 branches (2–6). *Thorax.* 7-T a 2-branched heavy, barbed spiniform with serrated tips. *Abdomen.* 6-I-V double; 7-I-II double, 3-branched on one side of segment I of one specimen; segment VIII with 16–25 small comb scales (CS), dorsolateral comb scales pointed, ventral ones broadly flattened and fringed; 1-S with 3–5 (on one side of one specimen, 2) moderately long branches; 1a-S number 8–10 tufts, usually 2-branched (1–2); 3–5 widely spaced pecten teeth (PT) on each side; 2a-S number 7–8, scattered dorsally and laterally with 1–3 branches; saddle with 2–4 stout, relatively long and 2–5 weaker, short marginal spines; 1-X with 1–3 branches; 4-X with 3–4 short branches, about half length of anal papillae; anal papillae about 2½ times length of saddle.

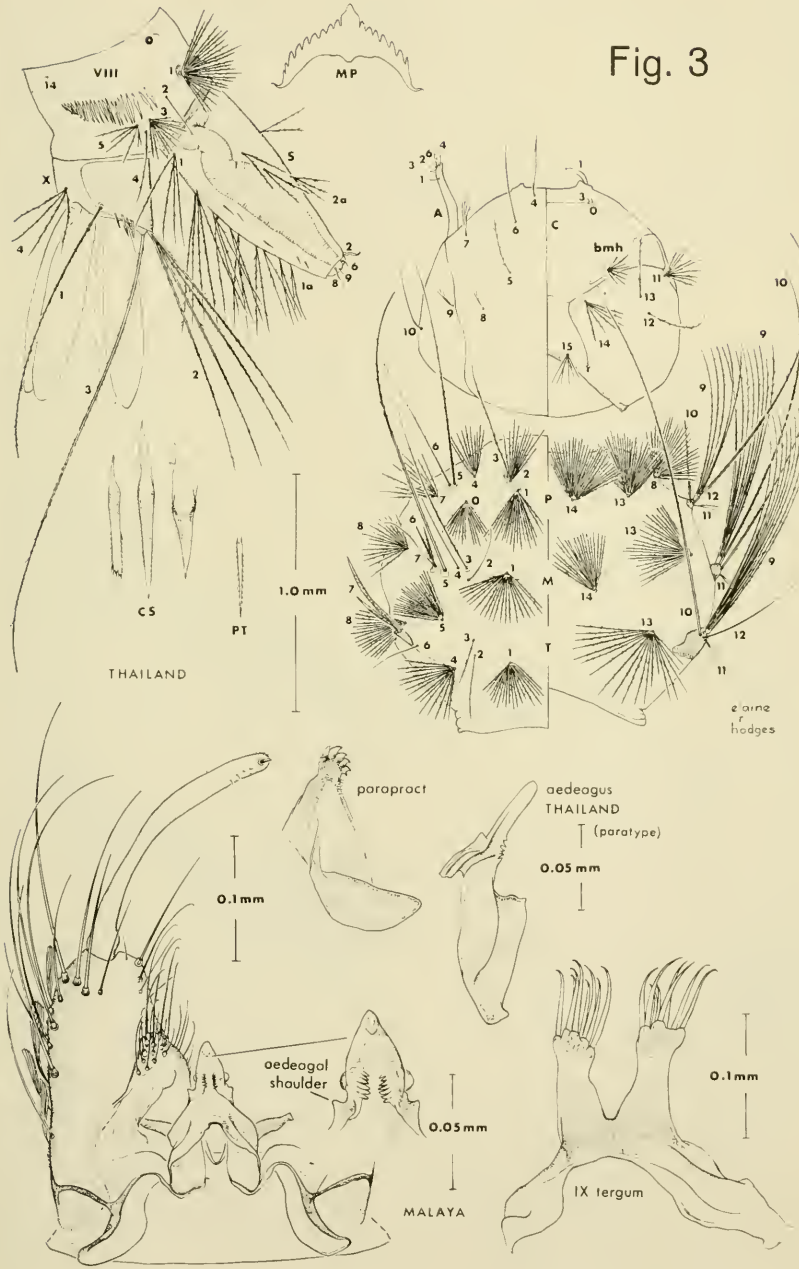
TYPE DATA. Holotype male #0914/11, *Lower Perak*, Pulau Tiga, MALAYA, 14-11-58 (W. W. Macdonald), terminalia, larval and pupal skins on slides; paratypes all males: #0914/9, same data as for holotype, with cast skins mounted; #01281/24, 8 mi. Bantung Rd, *Selangor*, MALAYA, 27-8-59 (W. W. Macdonald), terminalia, legs, larval and pupal skins mounted; #PU 24-35 and #PU 24-40, both collected in 1964 from *Phatthalung*, Muang, THAILAND (S. Chunchulcherm), and both with terminalia mounted. Both Thailand specimens without associated cast skins. The holotype and 1 paratype with associated larval and pupal skins from Malaya will be deposited in the British Museum (Natural History); the 2 paratypes from Thailand and 1 paratype with associated skins from Malaya are deposited in the U.S. National Museum. In addition there is 1 male from Malaya not labeled paratype which will be at the British Museum, namely, #0677/6 from Templer Park, *Selangor*, 25-6-58, with hind leg and larval and pupal skins mounted.

DISTRIBUTION. MALAYA; THAILAND.

HABITAT. Tree holes.

TAXONOMIC DISCUSSION. *T. denticulatus* differs from similar species, *bambusa*, *malayi*, and *tarsalis*, in having a large tooth on the larger fore claw of the male, equal male mid claws, a simple male mid tarsomere V (lacking spines or tubercles), feather-like scales on male hind tarsomere I, and small but distinct serrations on the distal margin of the aedeagal ventral projection. The aedeagal middorsal teeth of *denticulatus* are confined to the central area, whereas those of *bambusa* extend to the lateral edges of the aedeagus (fig. 5). The male fore claw of *bambusa* (fig. 5) has a small triangular tooth, much smaller than that of *denticulatus* (fig. 4). There are no reliable differences among the larvae and pupae of these species other than the presence of spicules on the pupal paddles of *tarsalis* and *bambusa* which are not present in *denticulatus*. The species most resembling *denticulatus* is *vicinus*, also found in Malaya. The male of *vicinus* has a similar aedeagus, identical feather-like scales on the hind tarsomere I, an equally simple mid tarsomere V, and a fore claw with equally large tooth (fig. 5). However, this tooth arises at about a 70 degree angle from the claw,

Fig. 3



TARSALIS

whereas the same tooth of *denticulatus* projects at about a 90 degree angle. *T. vicinus* differs more significantly in that tergum IX has each broad lobe slanted so that the length of inner edge is about one-third length of outer edge and that each lobe bears as many as 28 bristles which are twice as long laterally as medially (fig. 5); the male mid claws are unequal; its pupal paddle is heavily spiculed, and pupal seta 3-VII extends no more than to half the length of VIII. The larva of *vicinus* differs from *denticulatus* in having comb scales on a plate which is sometimes incompletely formed and in having 4-X double, longer than the anal papillae, and almost as long as 1-X.

Tripteroides (Tripteroides) malayi, n. sp.
(Figs. 2, 4, 5)

MALE. *Head.* Vertex with comparatively narrow anterior band of bright blue decumbent scales, lateral portion with silvery scales; the rest of the head with dark brown scales; occiput with row of erect dark brown scales; torus and clypeus grayish-brown; proboscis dark brown and about 1.3 as long as fore femur, several dark basal bristles present; palpi dark brown, 0.1 the length of proboscis. *Thorax.* Integument of scutum dark brown, yellowish on humeral area, with narrow dark brown scales (most are rubbed off); scutellum yellowish and heavily clothed with flat, broad black scales and 8 bristles; postnotum medium brown; anterior and posterior pronota yellowish; 8–9 black bristles and broad dark brown scales on anterior pronotum; narrow dark scales and 1 dark bristle on posterior pronotum; yellowish propleuron with 2 bristles; paratergite, postspiracular area, sternopleuron, mesepimeron, and meron dark brown; silvery broad appressed scales on sternopleuron from below prealar area to above mid coxa; a short line of silvery appressed scales between the sternopleuron and postspiracular area; mesepimeron almost bare except for a small patch of about 5 translucent silvery scales on anterior portion. *Legs.* Coxae with translucent scales; each femur with 2 distinct silvery spots—1 median and 1 sub-apical; mid femur also has silvery line running from just below base to one-third its length; hind tibia with diagonally striated setae on apical fourth and long spines and setae at apex; semi-erect scales on base of hind tarsomere I; no long feather-like scales are apparent on any of the legs and no specialized scales or setae exist on the mid legs; plantar surface of fore tarsomere V modified with 2 stout, sharply pointed basal spines plus 2–5 tubercles with small setae extending from them (fig. 4, holotype); plantar surface of mid tarsomere V modified with about 4 small tubercles, each with a small seta; hind tarsomere V unmodified. *Claws.* (Fore claws drawn from holotype; mid and hind claws drawn from paratype.) Fore and mid tarsal claws unequal, simple; hind claws small, simple, equal. *Abdomen.* (Fig. 4, holotype.) Terga dark dorsally; segments II and III with silvery lateral patches deeply emarginated along their apical borders (emargination more pronounced on III); lateral silvery patches on IV-VI divided into a larger and smaller patch on each segment; on segment IV of the paratype the patches are not as widely separated as on the holotype and are connected anteriorly by a single line of whitish scales; sterna pale gold. *Terminalia.* (Fig. 2, holotype.) Basimere with a few long strong bristles and many short ones; distimere slightly swollen in distal half with a few scattered fine setae and an apical spiniform appendage; aedeagus tapered distally, with strong middorsal teeth on

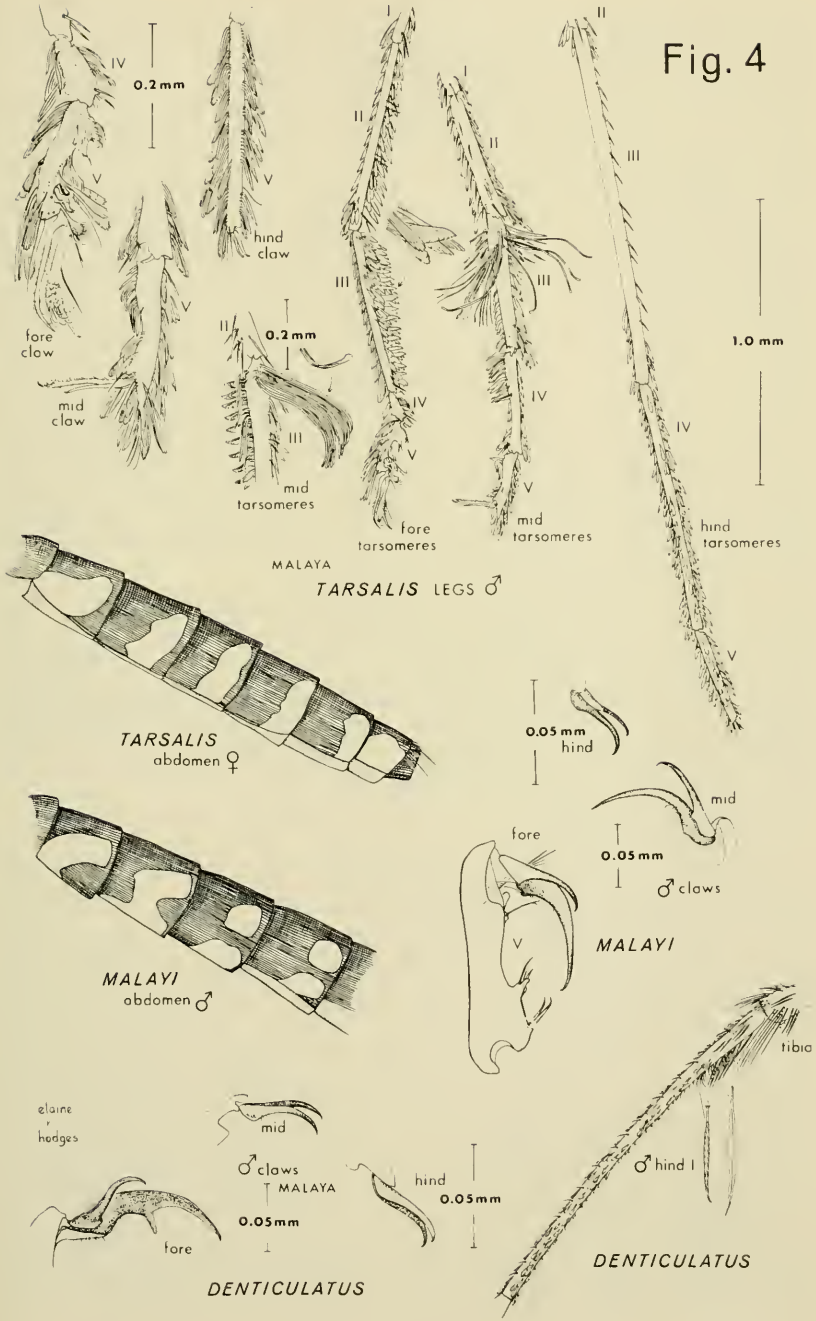


Fig. 4
0.2 mm
hind claw
fore claw
mid claw
0.2 mm
mid tarsomeres
fore tarsomeres
mid tarsomeres
1.0 mm
hind tarsomeres
MALAYA
TARSALIS LEGS ♂
TARSALIS
abdomen ♀
0.05 mm
hind
mid
fore
0.05 mm
♂ claws
MALAYI
MALAYI
abdomen ♂
tibia
elaine
hedges
mid
♂ claws
MALAYA
0.05mm
fore
hind
0.05mm
♂ hind I
DENTICULATUS
DENTICULATUS

each side of center line; ventral projection as in fig. 2, without teeth; parameres curved outwardly; paraproct with 5–6 teeth, 4–6 cercal setae; tergum IX with 8 bristles of equal length on each lobe in the holotype, 10 and 12 on lobes of the paratype; each lobe broad and slightly expanded at apex.

Pupa. Chaetotaxy similar to *tarsalis* (fig. 5). 3-VII long, reaching beyond posterior margin of VIII. Paddles gently rounded apically, not as pointed as *tarsalis*, smooth, without spicules, 1.8–2.0 times as long as wide (paddle drawn from holotype, fig. 5).

Larva. (Fig. 2, primarily holotype.) *Head.* 4-C single, expanded and flattened medianly, tapering to a fine point; 7-C 5-branched on the one specimen where it was present, a little longer than 4-C; 8-C 1–2 branched; 9-C very short branched tuft; 10-C single although with weak branch on one side of holotype and forked distally on one side of paratype; basal maxillary hair (bmh) strong, short, stellate; 14-C 2–3 branched; 15-C 3–5 branched; mental plate (MP) with 17–20 teeth. *Thorax.* 7-T spiniform, strongly barbed, single or double, longer than in most other species. *Abdomen.* 6-I-II 2-branched, 6-III-V 1–2 branched; 7-I single, 7-II 1–2 branched. Segment VIII with 10–12 comb scales (CS), spine-like except for 2–3 of the most ventral ones which have broad fringed apices; 1-S 3-branched; 1a-S total 9–10 tufts of 1–2 branches; 2a-S with 8–10 tufts scattered dorsally and laterally, 2–3 branched; siphon with 3 pecten teeth (PT) on each side; saddle with 2–3 long, strong marginal spines; 1-X single, very long; 4-X single, short and fairly strong; anal papillae longer than saddle.

Type data. Holotype male #0613/27, *Trengganu*, Gunong Tabu, Kuanta, 20 mi. Pahang Rd, Malaya, 7.v.58 (W. W. Macdonald), terminalia, legs, larval and pupal skins on slides; paratype male #0613/20, same data as holotype, terminalia, legs, pupal and larval skins on sides. Holotype with associated mounts will be deposited in the British Museum (Natural History), London; paratype and associated mounts will be retained in the U.S. National Museum.

Habitats. No record.

Distribution. Malaya.

Taxonomic discussion. Despite aedeagal resemblances to *vicinus*, *bambusa*, *tarsalis*, and *denticulatus*, *malayi* can be differentiated by its simple untoothed male tarsal claws, the absence of unusual setae and scales on the male legs, ventral projection of aedeagus without serrations, middorsal teeth confined to centerline of aedeagus, and the silvery lateral abdominal patches which are medianly emarginate on III and double on IV-VI. Tergum IX of *malayi* differs from that of *vicinus* in the same way as does this structure in *denticulatus*, although *malayi* has more tergal bristles (8–12) than *denticulatus* (see *vicinus*, fig. 5). The larva of *malayi* differs from the above mentioned species in having 4-X single and only 11–12 CS, but it resembles the larva of *similis* (Leicester), also found in Malaya, in these as well as in some other characters. However, *similis* has even fewer CS (6–7), a larger bmh, and a large stellate tuft for 14-C. The pupa of *similis*, like *vicinus*, differs from *malayi* in having spicules on its paddle and a short 3-VII,

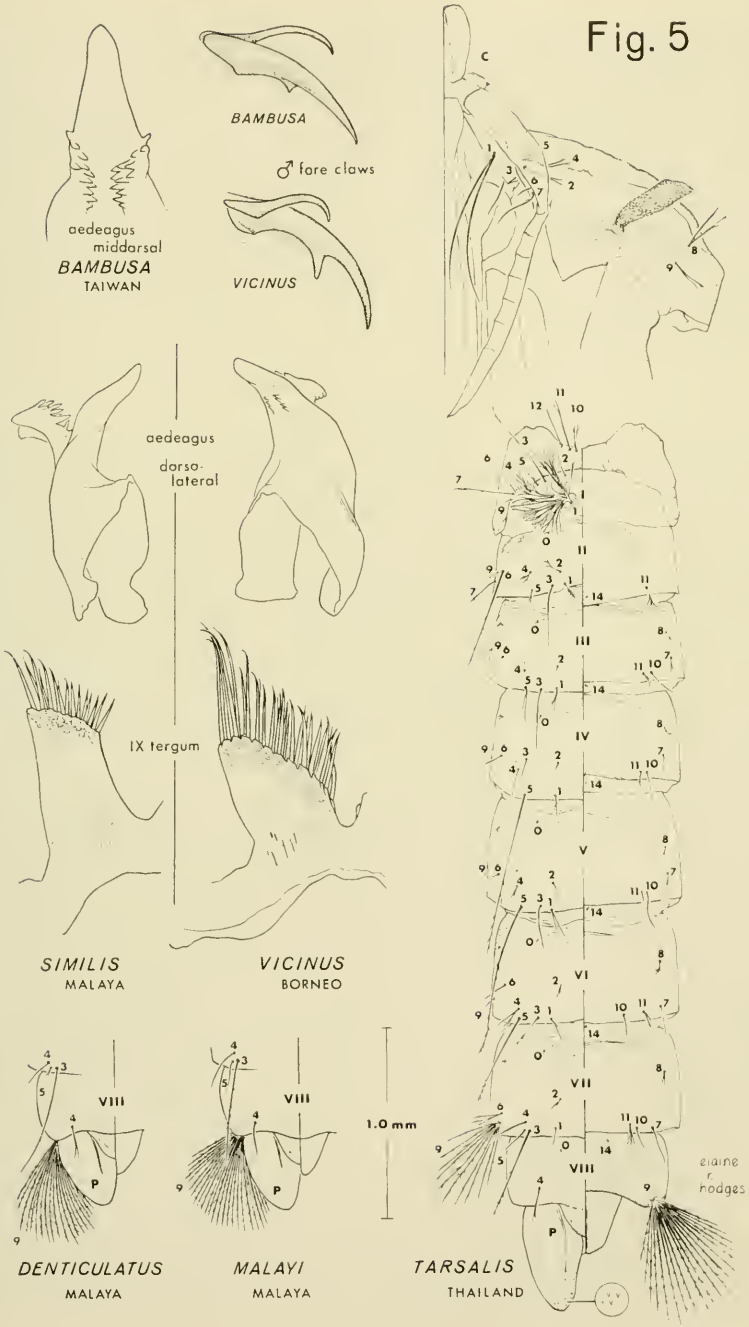


Fig. 5
BAMBUSA
♂ fore claws
VICINUS
aedeagus
middorsal
BAMBUSA
TAIWAN
aedeagus
dorso-
lateral
IX tergum
SIMILIS
MALAYA
VICINUS
BORNEO
1.0 mm
DENTICULATUS
MALAYA
MALAYI
MALAYA
TARSALIS
THAILAND
elaine
r.
hodges

reaching no more than one-half the length of VIII. There are clear differences between *malayi* and *similis* in the adult stage; *similis* has silvery scaling on the anterior and posterior pronota, large and unbroken lateral abdominal silvery patches, and a tooth on the larger fore claw of the male. Its terminalia resembles *nitidoventer* (Giles) with markedly swollen distimere, tergum IX with short bristles becoming somewhat longer laterally, and aedeagal ventral projection bearing anterior teeth without hump (see *similis*, fig. 5). Adult characters of *malayi* which differentiate it from *similis*, in addition to those mentioned earlier, are black scaling on the pronotal lobes, a relatively slender distimere, long bristles on tergum IX, and an untoothed aedeagal ventral projection with anterior hump.

Tripteroides (Tripteroides) tarsalis, n. sp.
(Figs. 3, 4, 5)

MALE. *Head.* Anterior half of vertex with bright blue decumbent scales, lateral portion with silvery scales; occiput with a row of erect dark brown scales; clypeus and torus bare, gray-brown; proboscis dark, measuring about 1.25 as long as fore femur, several dark basal bristles present; palpi dark, measuring about 0.1 length of proboscis. *Thorax.* Scutum yellowish-brown with narrow blackish scales, brownish supraalar and anterior promontory bristles; scutellum and postnotum yellowish-brown; anterior and posterior pronota and propleuron yellowish; anterior pronotum with broad dark scales and about 6 dark bristles; posterior pronotum with narrow dark scales interspersed with a few broad dark ones and 1 long, dark bristle; propleuron with 2 brown bristles; scutellum with broad dark scales and 8 dark bristles; dark medium brown patch covering paratergite, postspiracular and subspiracular areas, sternopleuron, mesepimeron, and meron; silvery broad appressed scales on sternopleuron from below prealar area to above mid coxa, a row of a few silvery appressed scales between the sternopleuron and postspiracular area; mesepimeron largely covered with silvery broad scales. *Legs.* Coxae with translucent scales; femora with the usual anterior silvery spots, 1 median and 1 subapical; mid femur with silver line extending from base to about one-third; on fore femur this stripe appears to be composed of yellowish scales extending from base to half length of femur, and on hind femur the stripe is absent. Fore tarsomeres II-V modified; II with some semi-erect scales; III with many erect and semi-erect scales; IV about half length of V with a few semi-erect scales; V with a few plantar tubercles surmounted by strong setae and 2 small pointed spines near the base, a number of very long scales also on the plantar surface followed by a long seta extending from shortly below a much reduced empodium, the latter with unusually short setae projecting from its apex; from the apex of tarsomere V projects a long, slender pedestal bearing a club-shaped structure covered with very narrow scale-like setae with recurved tips; mid leg with tarsomeres II-V modified; II with some semi-erect scales; III with semi-erect scales and a prominent basal patch of long, narrow, sinuous striated scales, the longest of these reaching to near the apex of the tarsomere; this patch of scales is visible in pinned specimens as a curved tuft which stands out at an angle as shown in fig. 4; mid tarsomere III also with a row of erect scales which in pinned specimens look like spines; mid tarsomere IV about two-fifths longer than V with a row of erect scales on basal half; mid tarsomere V

lacks any tubercles but is slightly modified in having its diameter narrowed medially, presenting a curved appearance, and in having a greatly reduced empodium; hind leg is as usually seen in the subgenus, without any modifications. *Claws.* (Legs and claws drawn from holotype.) Fore tarsal claws elongated and slender, subequal, the smaller claw narrow and hairy to before tip, the larger claw expanded into a very setiferous lobe medianly with a long seta arising below the lobed portion and reaching nearly to the tip of the claw; mid claws unequal, narrow, the smaller one simple, the larger bearing many setae and a small setiferous lobe near the apex; hind claws very small, simple, equal. *Abdomen.* (As in fig. 4, paratype female.) Terga dark brown dorsally with silvery-white lateral bands on III-VI, subapical on II-IV, apical on V-VI, with silvery patches almost completely covering the sides of II and VII; none of the silvery patches or bands meet dorsally; segments I and VIII all dark brown; sterna pale gold. *Terminalia.* (Fig. 3, holotype). Basimere with long strong bristles on lateral and distal margins; 4–6 long and many short bristles on basal lobe; distimere attenuated at middle, fine setae at distal portion and with an apical flattened spiniform appendage; aedeagus tapered distally with sharply projecting lateral shoulders, strong sharp middorsal teeth confined to each side of center line, a narrow ventral projection without teeth; paraproct with 5–7 teeth, usually with 4 cercal setae (2–5); parameres outwardly curved; tergum IX with 4–8 bristles on each lobe.

FEMALE. Coloration as in male. *Legs.* Apex of hind tibia and basal fifth of tarsomere I with long semi-erect setae, many of which are diagonally striated, and with a few feather-like ones on the tibia like those drawn for the male *denticulatus* (fig. 4, enlargement of setae and scales). *Claws.* Simple, small, equal on fore and mid; simple, small and unequal on hind leg.

PUPA. Chaetotaxy as in fig. 5 (not drawn from paratypes, 20 specimens examined). 3-VII reaches to or beyond posterior margin of VIII; paddles 1.5–2.0 as long as wide, pointed apically and with fine spicules on apical portion, extending up inner margin.

LARVA. (Fig. 3, not drawn from paratypes, 17 specimens examined). Description based on cast skins of paratypes. *Head.* 4-C single, long, expanded and flattened medially, tapering to a fine point; 7-C shorter than 4-C, with 3–5 branches; 8-C usually with 1–2 branches (1–3); 9-C about as long as 8-C, with 2–5 branches; mental plate (MP) with 15–18 teeth; bmh ranges from about half to three-fourths the length of 14-C, 8–16 branched; 14-C about two-thirds length of antenna, with 6–12 branches; 15-C 5–9 branched. *Thorax.* 6-M a barbed, stout spiniform, usually single, but 2–3 branched in some specimens; 7-T normally a 2-branched, pointed, barbed spiniform, occasionally single or 3-branched. *Abdomen.* 6-I-IV with 2 branches, 6-V occasionally single; 7-I-II single, though 2-branched on one side of one specimen; segment VIII with 16–26 comb scales; the dorsolateral scales pointed, a few lateroventral ones flattened, fringed; 1-S with 3–5 branches; 1a-S 8–14 in number, 1–3 branched; 2a-S number 8–12, scattered dorsally and laterally, usually with 2 branches (1–3); siphon with 3–5 PT on each side; saddle with 3–5 long, 2–3 short marginal spines; 4-X normally with 3–4 branches (3–5); 1-X usually single, long; anal papillae more than twice the length of saddle.

TYPE DATA. Holotype male #689/3, Fraser's Hill, W. *Pahang*, MALAYA, Sept., 1954 (J. A. Reid), terminalia and legs on slide; 3 paratypes from MALAYA include 1 female #689/5, same data as holotype,

with hind leg and antenna, larval and pupal skins mounted; 1 male #0611 2, Gunong Tabu, *Trengganu*, 7-5-58 (W. W. Macdonald), terminalia, larval and pupal skins mounted. Sixteen male paratypes from THAILAND were collected by SEATO Lab personnel in 1963 and 1964 (Sgt. E. Peyton, P. Boonyakanit, S. Chunchulcherm, C. Diraphat, S. Esah, S. Maneechai, S. Maniwongse, K. Mongkolpanya): Six originate from the province *Nakhon Nayok*, THAILAND: #NY 37-20 and #NY 37-24 from Moh Sing To, both with larval and pupal skins mounted; #NY 37-22 also from Moh Sing To; #NY 122-32 from Phaklory Mai, terminalia and larval skin mounted; #NY 123-10 from Khaoyai, terminalia and legs mounted; #NY 123-11 from Khaoyai. Five specimens came from *Chiang Mai*: #T-2195-10L and #T-2123-1P from Doi Sutep; #T-2413-1P, #T-2753, #T-2761. Two specimens were collected in a rain forest, 1 mile in altitude, located at Doi Sam Sao, *Tak*: #00265-104 and #00265-110. One specimen is from each of the following provinces: *Chanthaburi*, Khao Sai Dao Tai, evergreen forest, 1 mile altitude, #00864-8, pupal and larval skins mounted; *Nakhon Si Thammarat*, Ban Thuan Lek, primary rain forest, 1,000 ft. altitude, #01082-104; *Trang*, #TG-102-33, terminalia mounted. The holotype with associated slides will be deposited in the British Museum (Natural History), London; paratypes with associated slide mounts will be distributed between the British Museum (Natural History), London and the U.S. National Museum, Washington, D.C.

HABITAT. Tree holes.

DISTRIBUTION. MALAYA, THAILAND. In addition to the holotype and paratypes, 1 male with associated pupal skin from *Selangor*, MALAYA, and 25 specimens from THAILAND were examined. The Thailand material contained 1 whole larva and 17 males with 9 associated larval and pupal skins from *Chiang Mai*; 3 males, 2 with associated pupal skins, and 1 female with associated pupal skin from *Nakhon Nayok*; and 2 males, 1 with associated larval and pupal skins, and 1 female with associated pupal skin from *Chanthaburi*.

TAXONOMIC DISCUSSION. *T. tarsalis* can be distinguished from other known species of the subgenus by its male tarsal and claw modifications, especially by the prominent tuft of long scales on mid tarsomere III, erect scales on mid tarsomeres III and IV and on fore tarsomere III, and by its elongated hairy and lobed claws. The aedeagus of *tarsalis* differs from its nearest morphological relatives (*bambusa*, *denticulatus*, *malayi*, *vicinus*) in having sharply defined lateral shoulders. Mid-dorsal teeth are confined to the center line of the aedeagus, in contrast to *bambusa*. The aedeagal ventral projection is without teeth, unlike *denticulatus*. The lobes of tergum IX tend to be narrower than those of *malayi* and differ from *vicinus* for the same reasons as does tergum IX of *denticulatus* (see *vicinus*, fig. 5). The pupa is distinguishable from *malayi* and *denticulatus* in having paddle spicules, from

vicinus in having 3-VII long, reaching to or beyond posterior margin of VIII, whereas in *vicinus* 3-VII is much shorter. Pupae of *tarsalis* and *bambusa* are virtually indistinguishable, inasmuch as *bambusa* possesses paddle spicules in the same positions as does *tarsalis*, as well as other similar characters. The *tarsalis* larva shows no reliable difference from *bambusa* and *denticulatus*. It differs from *malayi* in having a branched 4-X, a greater number of comb scales, and more branches in 14-C. The larva of *vicinus* differs from *tarsalis* in the possession of a complete or incomplete comb scale plate, and long double 4-X.

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A REVISED INTERPRETATION OF THE PROCTIGER OF MALE URANOTAENIA WITH A RELATED NOTE ON HODGESIA

(DIPTERA: CULICIDAE)[1,2]

E. L. PEYTON and R. H. HOCHMAN, *Southeast Asia Mosquito Project, Smithsonian Institution, Washington, D.C. 20560*

Although the structure of the male terminalia has long been recognized as an important criterion in the classification of mosquitoes, their structure in the genus *Uranotaenia* Lynch Arribálzaga remains little studied and incompletely understood. The forms of the proctiger and the ninth tergite have received contradictory and confused treatment. Edwards (1920) proposed the term "lobes of the ninth tergite" for the more or less distinct prominences at the apical margin of the tergite. He indicated their various development in different genera, mentioning that in at least one species of *Uranotaenia* they were without bristles. Subsequent authors recognized Edwards' lobes in other species of *Uranotaenia* (Dyar and Shannon, 1925; Matheson, 1944; King and Hoogstraal, 1946; Pratt, 1946; La Casse and Yamaguti, 1950; Galindo, Blanton and Peyton, 1954; Peters, 1963a, 1963b, and 1964). Lane (1943 and 1953) used the term "external bars" for these structures. Belkin (1953 and 1962) described the lobes of the ninth tergite with "ventrolateral sclerotization" in South Pacific *Uranotaenia.* The proctiger was regarded as almost completely or completely membranous. Freeborn (1924), however, studying terminalia of many culicid genera, concluded that in *Uranotaenia* the proctiger bore on its dorsal face a pair of "broad, well chitinized sclerites recurved over the summit," to which he applied Crampton's term "epiprocts." He seems to have drawn this generalization from an examination of one species, *U. geometrica* Theobald, which he figured with a dorsal lobar plate of the proctiger, discontinuous with the ninth tergite and with no basolateral extension. Carpenter, Middlekauff, and Chamberlain (1946), while following the standard usage of Edwards' terminology, parenthetically registered doubt that these were true lobes of the ninth tergite in *Uranotaenia* and suggested that the so-called "lobes" were productions of the tenth tergite or tenth sternite (proctiger). Yamaguti and La Casse (1951) and Carpenter and La Casse (1955) reiterated this interpretation. The most thorough examination of *Uranotaenia* terminalia was made by Dampf (1943) in his study of *Uranotaenia syntheta* Dyar and Shannon. His excellent, detailed figures of the terminal structures in lateral, posterior, and tergal views show basolateral sclerotization of

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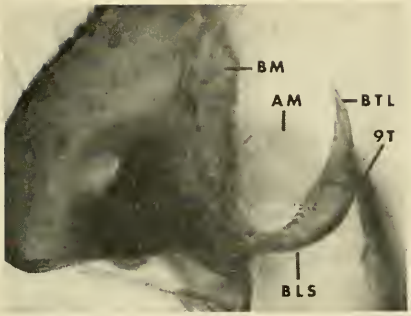

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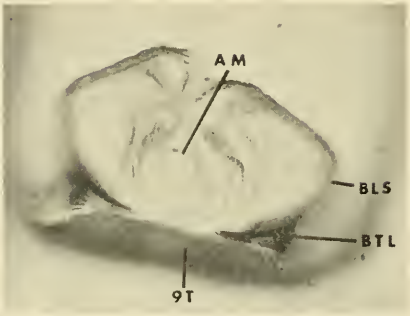

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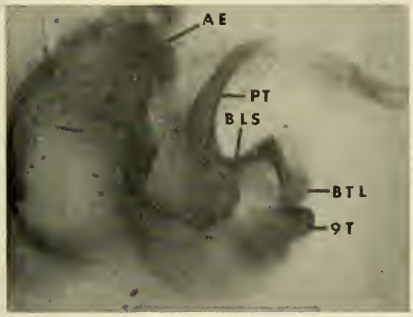

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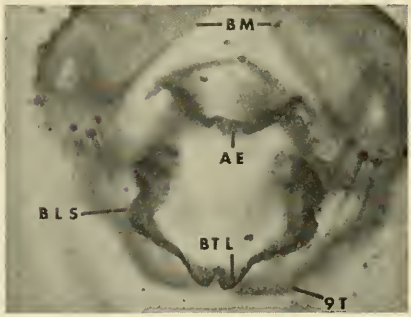

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Figs. 1 and 2, *Uranotaenia geometrica* Theobald, ♂ terminalia: 1, lateral view; 2, anterior view. Figs. 3 and 4, *Hodgesia malayi* Leicester, ♂ terminalia: 3, lateral view; 4, anterior view. Abbreviations: AE, aedeagus; AM, anal membrane; BLS, basolateral sclerotization of proctiger; BM, basimere; BTL, basotergal lobe of proctiger; PT, paraproct; 9T, ninth tergite.

the proctiger articulating with a pair of lobes which are fused with the apical margin of the ninth tergite. These lobes he regards as tongue-shaped "protuberancias" of the ninth tergite. Like Edwards, he asserts that corresponding lobes occur in many genera ("tan frecuentes en muchos culícidos").

In the course of studies of the genus *Uranotaenia* in Southeast Asia, we have determined that the "lobes of the ninth tergite" of the above-mentioned authors are, in *Uranotaenia*, wholly continuous with the basolateral sclerotization of the proctiger, and thus they are on the contrary, lobes of the proctiger (figs. 1, 2). Belkin and Page in work in progress on Jamaican *Uranotaenia* have independently arrived at this same conclusion and have proposed the term "basotergal lobes of the proctiger" for these structures (personal communication with Dr. Belkin).

This paper presents techniques that allow careful study of terminalia, indicates the range of development of the proctiger lobes in *Uranotaenia*, and considers their possible phylogenetic significance. It is hoped others will be stimulated to investigate the proctiger development of additional species of *Uranotaenia* and allied genera. Further study of the variation in the form of the basotergal lobes of the proctiger with speciation will, we feel certain, increase our understanding of the phylogeny within the genus and with other genera.

The experiences gained from the present study indicate the need to emphasize the absolute necessity of dissecting the terminalia of *Uranotaenia*, for an accurate interpretation of all the structures. Whole mounts are totally inadequate and should be made only after an adequate series of dissections has been prepared. In view of the obvious value, we present a detailed discussion of techniques we have found satisfactory for the preparation and dissection of the terminalia of *Uranotaenia*.

Our method of preparation of terminalia is modified from that of Galindo, Blanton, and Peyton (1954). After the terminal segments of several specimens are clipped they are placed in small 5 cc test tubes containing 10% KOH. The tubes are then placed in a beaker of boiling water for approximately 20 minutes. The parts are transferred to a weak solution of acetic acid to neutralize the alkali. They are then dehydrated in alcohol and transferred to a staining solution of 1% acid fuchsen in 70% alcohol and allowed to remain for approximately 20 minutes. The staining dish should be as small as possible for the terminalia of the smaller species are extremely difficult to find after staining. The dish should be covered to prevent rapid evaporation of the alcohol. The terminalia are transferred from the stain to a drop of liquid phenol on a concave slide for dissection. If clearing of the stain in the phenol appears too rapid, a small drop of copal-phenol can be added to arrest the clearing. The individually dissected parts are positioned in minute drops of copal-phenol on a clean slide and then placed in a drying oven for a minimum of four days in order to drive off the phenol and harden the drops. If larger amounts of copal-phenol are used the required drying period must be increased, for any remaining phenol will crystalize as the slide ages and degrade the quality of the mount. After the copal-phenol is thoroughly dried, small bits of coverslip glass are placed around the specimen and then covered with a drop of thin balsam and a small cover slip. If prepared in this manner the prepositioned parts will not move and the bits of glass will prevent crushing from the gradual settling of the cover slip. There are other satisfactory preparation methods, but all share two essential cautions. Due to the extremely small size of many *Uranotaenia* species and the generally weakly sclerotized structures of the terminalia, it is absolutely necessary to use a moderate stain after maceration in KOH.

FIG. 5

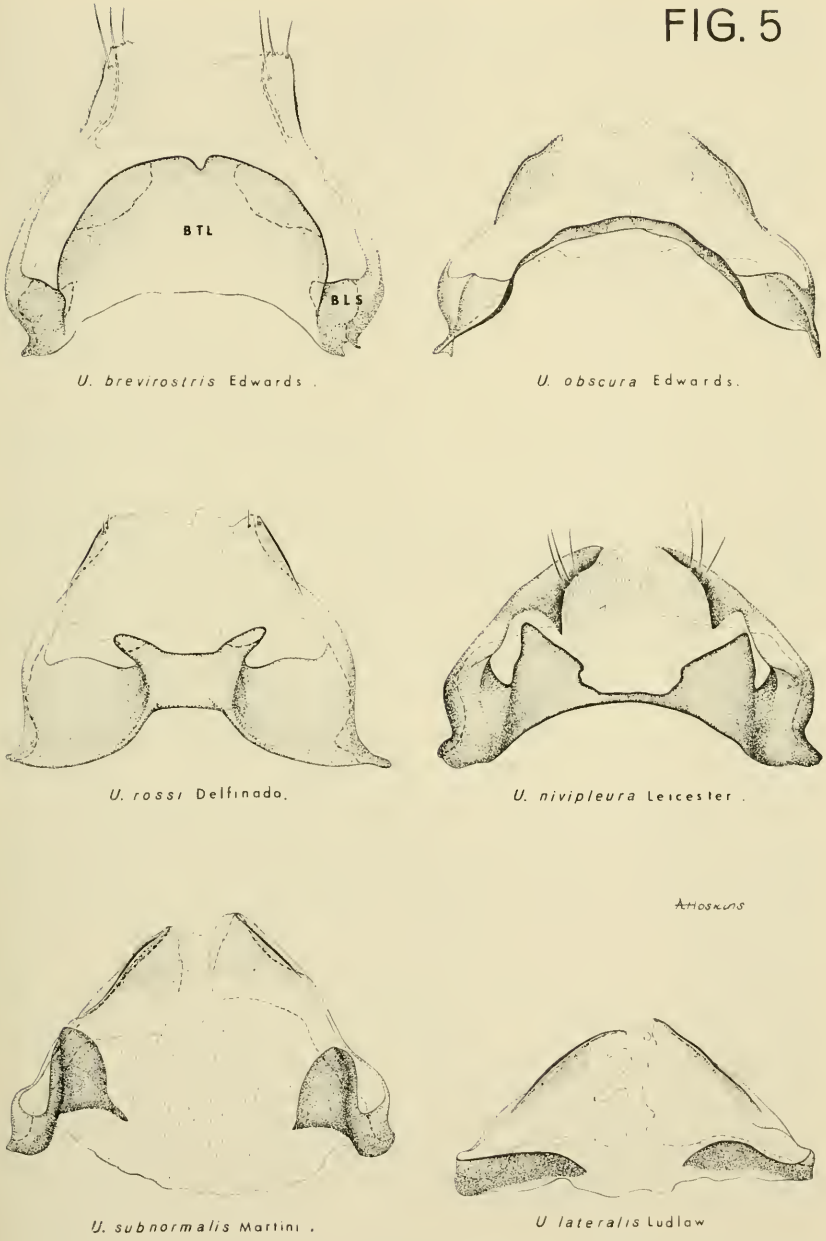

Fig. 5, Tergal views of proctiger of *Uranotaenia* species. Abbreviations: BLS, basolateral sclerotization of proctiger; BTL, basotergal lobe of proctiger.

Dissections should never be made in the staining solution or other dark media, for the structures and points of attachment can not be seen clearly under an ordinary dissecting microscope. Dissecting in the staining solution as suggested by Galindo, Blanton, and Peyton (1954), is the primary reason these authors failed to correctly interpret the lobes of the ninth tergite and the proctiger in the American *Uranotaenia*. It is strongly suggested that prior to mounting or dissecting any mosquito terminalia, a thorough examination be made from all angles in a clear non-volatile medium such as phenol, glycerin, or clove oil. Only in this manner can all the structures and points of attachment be correctly identified and the structures removed in a logical sequence without damage. With terminalia of *Uranotaenia* an examination should also be made to assure that the anal lobes are not everted. This condition has been observed in the majority of reared material examined. As the presence and position of apical bristles and the overall configuration of the proctiger are of diagnostic value, an attempt to reshape the structure should be made. We have usually found it sufficient to insert a dissecting pin through the anterior orifice of the proctiger and gently push the lobes outward until they are fully distended.

Our analysis of the development of the proctiger in *Uranotaenia* is based upon an examination of 30 species (26 Southeast Asian, three American, and one South Pacific). Two American species, *U. geometrica* and *U. syntheta*, were also examined since they are the only two species whose terminal structures have been treated in some detail by previous authors (Freeborn, 1924; Dampf, 1943). We find in *geometrica* that those dorsal structures, identified by Freeborn as epiprocts, are extensions of the basolateral sclerotization, slightly recurved, but well above the dorsal face of the proctiger—that is, they are the basotergal lobes (figs. 1, 2). In *syntheta* the suture between the "protuberancias" and the basolateral sclerotization shown by Dampf in his posterior view is an interpretation not supported by our specimens. Furthermore, his lateral view of the basolateral sclerotization shows no such suture.

Essentially two types of development are seen in the basotergal sclerotization. In type I the sclerotization takes the form of a single broad median lobe, with or without a shallow or deep median apical emargination (fig. 5: *obscura* Edwards, *nivipleura* Leicester, *brevirostris* Edwards, *rossi* Delfinado). In the extreme form of this type (fig. 5: *nivipleura*) the median emargination is quite deep and the tergal sclerotization gives the appearance of type II. However, this condition of type I can be distinguished from type II development by the presence of a completely sclerotized dorsal bridge connecting the differentiated corners. This type seems to characterize Group C of Edwards (1941). In type II the basolateral sclerotization terminates in more or less well defined lobes which have an incompletely sclero-

tized or wholly membranous dorsal bridge. The lobes may be finger-like and well separated (fig. 5: *subnormalis* Martini) or extremely shallow and often closely approximated (fig. 5: *lateralis* Ludlow). This type seems to characterize Edwards' Groups A and B.

We have made a limited investigation of the development of the basolateral sclerotization in other genera. To our knowledge it is only in *Uranotaenia* and *Hodgesia* Theobald that the basolateral sclerotization assumes its peculiar tergal lobar modification. We have studied in detail two species of *Hodgesia*, *malayi* Leicester (figs. 3, 4) and *bailyi* Barraud. In *Culex* (*Melanoconion*) Theobald, the basolateral sclerotization is also highly modified but it is reasonably clear that the modification does not adapt it to the same function, even though the precise nature of their function may not be understood.

The strong development of ninth tergal lobes as seen in most other genera is conspicuously absent in *Uranotaenia* and *Hodgesia*. It is likely that the basolateral lobes in these genera have evolved to assume the function of the ninth tergal lobes.

Edwards (1932) erected the tribe Uranotaeniini to include *Uranotaenia*, *Hodgesia*, and *Zeugnomyia* Leicester. Belkin (1962) placed *Uranotaenia* and *Hodgesia* in separate monotypic tribes, indicating that the two genera were unrelated and without close relatives. It is beyond the scope of this paper to make tribal classifications; however, the unique specialization of the proctiger and the absence of developed ninth tergal lobes in both genera appear to suggest a closer affinity than hitherto understood.

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We are indebted to Dr. Alan Stone of the U.S. Department of Agriculture and to Dr. Botha de Meillon, Project Leader, Southeast Asia Mosquito Project, for helpful discussions, encouragement, and assistance during the course of the work and for examining and commenting on the manuscript. We also had the privilege of discussing the work with Dr. J. N. Belkin, who kindly made his unpublished contribution on the subject available to us. Our thanks are due to Lt. Col. Bruce F. Eldridge for specimens of *U. geometrica* from his collection.

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A NEW LOCALITY RECORD FOR IXODES WOODI BISHOPP[1,2]

(ACARNIA: IXODIDAE)

During a survey of ticks occurring in Alabama that extended from the spring of 1963 through the fall of 1966, one engorged female, of *Ixodes woodi* Bishopp was collected from a woodrat during the month of March. This specimen was referred to Dr. Glen M. Kohls of the U. S. Public Health Service, Rocky Mountain Laboratory, for confirmation of identification. It appears to represent the first record of the occurrence of *I. woodi* in this State or even in the Southeast. According to the records of Kohls (personal communication), *I. woodi* has only been reported from Texas, Indiana, Colorado, and California. Practically all of these collections were associated with woodrats.

The single female specimen of *I. woodi* was taken on an eastern woodrat from a cave seven miles north of Flat Rock, Alabama, in Jackson County. Jackson County is in the extreme northeast corner of the State. Two specimens of *Dermacentor variabilis* (Say) were taken from the same animal.

Two subspecies of the eastern woodrat, *Neotoma floridana* (Ord.), occur in Alabama: *N. floridana illinoensis* How. and *N. floridana magister* Baird. The female of *I. woodi* was taken on the latter subspecies. Seventeen specimens of *N. floridana magister* were collected and six of *N. floridana illinoensis*; these 23 woodrats, however, yielded only one specimen of *I. woodi*. Of interest is the fact that the one specimen collected was taken from a woodrat trapped in a cave. —JOSEPH C. COONEY and KIRBY L. HAYS, *Department of Zoology-Entomology, Auburn University Agricultural Experiment Station, Auburn, Alabama 36830.*

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A NEW MOSQUITO RECORD FOR THE UNITED STATES
(DIPTERA: CULICIDAE)

A single male of *Culex* (*Aedinus*) *latisquama* (Coquillett) from Lee County, Florida, was recently found in the United States National Museum. The handwritten label is "Estero, Fla. J. B. Van Duzee." This specimen was undated, but Junius B. Van Duzee collected at Estero from April to July of 1906. He found *Wyeomyia mitchelli* (Theobald) (= *W. antoinetta* Dyar and Knab), *W. vanduzeei* Dyar and Knab, and *Culex pilosus* (Dyar and Knab) (= *C. floridanus* Dyar and Knab). Estero is the type-locality for *vanduzeei* and the two synonymous species.

Culex latisquama was described from Port Limon, Costa Rica, and has also been found in Panama, Honduras, and Surinam. It is the type species of the subgenus *Tinolestes* Coquillett, a synonym of *Aedinus* Bourroul, and it is the first record of the subgenus in the United States. The mosquito is small and similar in appearance to species of the subgenus *Melanoconion*, but the male palpus is only about half as long as the proboscis, segment 4 being reduced and segment 5 being minute. The terminalia of this specimen agrees very well with those of specimens from Panama. The species breeds in crabholes, and a search for larvae in crabholes in the vicinity of Estero might rediscover the species as well as extend the range of *Deinocerites cancer* Theobald.—ALAN STONE, *Systematic Entomology Laboratory, Entomology Research Division, ARS, USDA, c/o U.S. National Museum, Washington, D. C. 20560.*

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>
> ———— and L. M. Walkley. 1951. *in* Muesebeck *et al.*, Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. Dept. Agr., Agr. Monogr. 2: 90–184.

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