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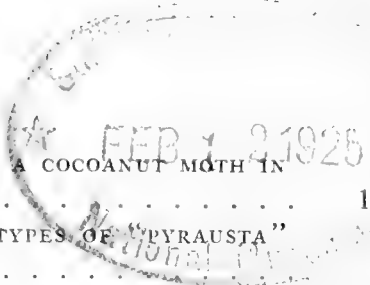
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PROCEEDINGS OF THE
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No. 1

NEW PARASITIC MITES OF THE GENUS LAELAPS.

By H. E. EWING, *U. S. Bureau of Entomology.*

The genus *Laelaps* Koch, in its restricted sense, may be defined as follows: Gamasid mites in which the chelicerae are toothed, and always, in the case of the female, bear a seta on the fixed arm. Ventral plates of the female consisting of a large sternal plate, a genito-epigastric plate of varying size but frequently large and extending to the anal plate, an anal plate which is always provided with two paired and one unpaired anal setae. Dorsal shield in both sexes undivided. Genital opening of male at the anterior margin of sternum; of female in front of genito-epigastric plate and not provided with an epigynum. All members of the genus are parasitic on vertebrates, especially ground burrowing or ground nesting mammals. In the following paper nine new species are described. These species are separated as follows:

KEY TO THE SPECIES OF LAELAPS DESCRIBED IN THIS PAPER.

1. Body almost as broad as long, subdiscal; sternal pores broad openings, not mere slits; sternal setae heavy spines.....*L. hollisteri*, new species.
Body considerably longer than broad; sternal pores either slit-like or apparently wanting.....2.
2. Each chelicera with a brush of long setae just below the attachment of the movable arm.....*L. barbatus*, new species.
No brush of setae on chelicera.....3.
3. Anal plate fully twice as long as broad; anus very large, its greatest diameter being almost equal to the width of anal plate.....
L. braziliensis, new species.
Anal plate never more than one and a half times as long as broad and the greatest diameter of anus not more than equal to one-half of the width of anal plate.....4.
4. First pair of coxae with a pair of large tooth-like spines on posterior side.....*L. wetmorei*, new species.
First pair of coxae without a pair of tooth-like spines.....5.
5. Legs very stout; femur I as broad as long.....*L. rubustipes*, new species.
Legs more slender; femur I much longer than broad.....6.
6. Coxa II with a tooth-like spine on its anterior margin.....
L. californicus, new species.

- Coxa II without a tooth-like spine.....7.
7. Body with well developed shoulders opposite the second coxae.....
L. glasgowi, new species.
 Body without shoulders, the lateral margins opposite the second coxae
 being evenly curved.....8.
8. Seta on chelicera greatly inflated near its base.....*L. virginianus*, new species.
 Seta on chelicera not inflated.....*L. reithrodontis*, new species.

Laelaps hollisteri, new species.

Female.—Large, stout, brownish and rather heavily spined. Chelicerae small for such a large species; fixed chela shorter than the movable one, with three teeth and a simple seta about as long as the chela itself; movable chela with three teeth, two lateral and one terminal. First pair of anterior apical setae, straight, parallel; second pair, marginal and strongly recurved; third pair as close together as second pair but much longer and more strongly recurved. Body setae short, stiff, but not stout spines. Sternal plate about twice as broad as long, front margin almost straight but hind margin strongly arched, anterior corners produced into long cusps. Front pair of sternal pores broad, open, situated approximate and posterior to first pair of sternal setae; second pair of sternal pores smaller than the first pair and situated inside and slightly posterior to the second sternal setae. Sternal setae, stout, spine-like; first pair slightly smaller than the other two pairs; second pair not exactly between the first and third pairs. Genito-epigastric plate rather small and poorly chitinized, falling far short of anal plate. Anal plate triangular, slightly longer than broad; anus situated about its greatest diameter from the anterior margin; paired anal setae subequal to unpaired anal seta, situated slightly in front of posterior margin of anus; unpaired anal seta situated about half the distance from the anus to tip of anal plate. Legs very short and stout; first pair but slightly longer than second pair.

Length, 0.83 mm.; width, 0.65 mm.

Male.—Unknown.

Type host and type locality.—*Peromyscus californicus* sent to National Zoological Park from San Francisco, California.

Type slide.—Cat. No. 900, U. S. N. M.

Described from six females taken from members of the host species kept in a cage at the office of N. Hollister, superintendent of the National Zoological Park at Washington, District of Columbia. This species is of the general type of *L. agilis* Koch and *L. peruviana* Banks, but is much broader than either of these two described species, has a sternal plate of an entirely different shape and differs from them in several other characters.

Laelaps barbatus, new species.

Female.—A stout species with short legs. Chelicerae peculiar in that each has a brush of five setae situated just behind the articulation of the movable chela and on the opposite side from this brush a single large spine-like seta. Sternal plate almost twice as broad as long; each anterior corner produced into

a long slender process which extends to the base of the first coxa. Sternal pores are diagonal slits of equal length; the first pair is immediately behind the first pair of sternal setae and the second pair is immediately behind the second pair of sternal setae. Sternal setae subequal, arranged into two divergent longitudinal rows. Genito-epigastric plate longer than broad and not as broad as the space between the posterior coxae; with six setae, all marginal and the last pair situated at the posterior corners of the genito-epigastric plate. Anal plate broadly and evenly rounded in front and much prolonged posteriorly. Anus small, situated slightly less than its greater diameter from the anterior margin of anal plate; paired anal setae slightly smaller than the unpaired seta and situated slightly in front of the posterior margin of anus; unpaired seta situated almost at the tip of the anal plate and about twice its length from the anus. Legs very stout; femur II and patella II subequal and both broader than long.

Length, 0.96 mm.; width, 0.45 mm.

Male.—Unknown.

Type host and type locality.—From a lemur, Mahanoro, Madagascar.

Type.—Cat. No. 901, U. S. N. M.

Described from a single female specimen, the holotype, taken from a dried lemur skin (U. S. N. M. 63337) collected about 50 miles northwest of Mahanoro, Madagascar. The presence of a brush of setae on each chelicera differentiates this species from all others mentioned in this paper.

***Laelaps braziliensis*, new species.**

Female.—A small, stout species. Chelicerae very stout; movable chela about twice as big as fixed chela and strongly hooked at the end; fixed chela almost straight with small teeth at its tip. First pair of anterior apical setae slightly curved, strongly divergent and twice as long as second pair. Sternal plate broader than long, with anterior corners prolonged into long spine-like processes which extend between the first and second coxae. Sternal pores slit-like; first pair slightly posterior and lateral to the first pair of setae; second pair half way between second and third pairs of sternal setae. Genito-epigastric plate small, not as broad as the distance between posterior coxae. Anal plate very long, rounded in front and attenuated behind; anus very large, rim thicker in front than at the sides, and situated not over one-fourth its greatest diameter from the anterior margin of anal plate; paired anal setae situated slightly behind the middle of the anus and about half way from the anal rim to the margin of anal plate; unpaired anal seta stouter than the paired ones and situated at the apex of anal plate. Legs stout, all shorter than the body; femur I and patella I subequal.

Length, 0.49 mm.; width, 0.29 mm.

Male.—Not known.

Type host and type locality.—*Kerodon spiki* from Bahia, Lamas, Brazil.

Type.—Cat. No. 902, U. S. N. M.

Described from a female, holotype, taken from a skin of *Kerodon spiki* ♀ (U. S. N. M. 123391), collected May 15, 1903, by A. Robert at Bahia, Lamas, Brazil. This species differs from all those known to the writer in having such a large anal opening and long anal plate.

Laelaps wetmorei, new species.

Female.—Medium sized, stout and spiny. Chelicerae stout, chelae unequal. First pair of anterior apical setae close together, straight, parallel; second pair dorsal rather than marginal and strongly recurved; third pair closer together than the second pair, longer and more strongly recurved. Sternal plate about as broad as long, broadest between coxae II and III. Sternal pores slit-like; first pair directly behind the first sternal setae, transverse; second pair about midway between second and third pairs of sternal setae, oblique. Sternal setae almost subequal and arranged into two divergent lines. Genito-epigastric plate incompletely divided into genital and epigastric plates. Epigastric plate proper broader than the space between the posterior coxae and with eight, long, subequal marginal setae. Anal plate broader than long; anus situated about two-thirds its greatest diameter from the anterior margin of the anal plate; paired anal setae situated at about the level of the posterior margin of anus, smaller than the unpaired anal seta; unpaired anal seta almost as long as the anal plate itself and situated near the tip of anal plate. Legs stout, femora I and II and patella I and II spined. Coxa I with a large tooth-like spine at its base posteriorly; coxa II with a very sharp, stout, low tooth-like spine on its anterior side; coxa III with large tooth-like spine on its postero-inner aspect; coxa IV without any tooth-like spine.

Length, 0.79 mm.; width, 0.52 mm.

Male.—Not known.

Type host and type locality.—A rat (Muridae) from Carhué, Province of Buenos Aires, Argentina.

Type slide.—Cat. No. 903, U. S. N. M.

Described from the following: Six females (type slide) from a rat (Biol. Sur. 236319) collected by A. Wetmore at Carhué, Buenos Aires Province, Argentina, Dec. 16, 1920; other females as follows, from rats by the same collector; four (Biol. Sur. 236318) at Carhué, Province of Buenos Aires, Argentina, Dec. 16, 1920; three (Biol. Sur. 236320) at Carhué, Province of Buenos Aires, Argentina, and one (Biol. Sur. 236289) at Kilometro 182, Territory of Formosa, Argentina. The tooth on coxa I in this species is very characteristic. Its large size and its position at the base of the segment at the middle of the posterior border differentiates this species, I believe, from all others of the genus.

Laelaps robustipes, new species.

Female.—A small stout species. Chelicerae moderate; movable chela curved and with three large teeth in addition to terminal hook of the element; fixed

chela smaller, straight and with a few minute teeth. Anterior apical setae all slightly curved spines; anterior pair subequal to second pair, divergent; second pair directed backwards; third pair much stouter and longer than second pair. Sternal pores, oblique slits and in the usual position; sternal setae large and subequal, anterior and posterior pairs marginal. Anal plate longer than broad; anus very large; paired anal setae slightly smaller than unpaired seta and situated in front of posterior margin of anus; unpaired anal seta situated its length from the anus and almost at the tip of anal plate. Apparently all coxae without tooth-like spines. Second pair of legs very stout; femur almost twice as broad as long; patella similar to femur but scarcely as wide; tibia as broad as long; tarsus almost twice as long as tibia and ending in a terminal hook.

Length, 0.58 mm.; width, 0.38 mm.

Male.—Not known.

Type host and type locality.—From a rodent at Guaminí, Province of Buenos Aires, Argentina.

Type slide.—Cat. No. 904, U. S. N. M.

Described from one female taken from a rodent at Guaminí, Province of Buenos Aires, Argentina. The second pair of legs in this species is stouter than in any of the other American species.

***Laelaps californicus*, new species.**

Female.—Chelicerae moderate, when extended reaching beyond the tips of palpi; both arms curved and of nearly the same length; seta leaf-like toward its base, as long as one of the arms of the chelicerae. Anterior pair of anterior apical setae, straight, divergent; second pair strongly recurved and incurved; third pair recurved but not incurved, longer than the second pair. Sternum about as broad as long; sternal setae long, slender, subequal and arranged into two divergent lines. Anal plate subtriangular, about as broad as long; anus situated about three-fourths its greatest diameter from the anterior margin of anal plate; paired anal setae situated at about the level of the middle of the anus; unpaired anal seta longer than paired anal setae and situated about one-half its length from the anus. Coxa II with a sharp, tooth-like spine on its anterior margin, all other coxae without a tooth-like spine. Legs rather slender for the genus; first pair much longer than the second pair; tarsus I but slightly longer than tibia II.

Length, 0.67 mm.; width, 0.46 mm.

Male.—Not known.

Type host and type locality.—Host (?); type locality, Topaz, Calif.

Type slide.—Cat. No. 905, U. S. N. M.

Described from ten females taken from a mouse nest (Bishop No. 7650) at Topaz, California, May 29, 1918. This species is related to *L. robustipes*, new species, but does not have the stout second pair of legs.

Laelaps glasgowi, new species.

Female.—Medium sized with well developed shoulders. Chelicerae with subequal chelae and each hooked at the tip. Anterior pair of anterior apical setae about straight, divergent; second pair strongly recurved and incurved; third pair strongly recurved and longer than second. Sternal plate about as broad as long and produced into a long, sharp cusp on each side between the second and third pairs of coxae. Sternal pores straight, oblique slits. Sternal setae subequal and arranged into two oblique rows. Anal plate about as broad as long. Legs moderate; first pair extending beyond the tips of second by almost the full length of tibiae and tarsi; tarsus I of uniform width throughout and about one and a third times as long as tibia I; tibia I slightly longer and slightly narrower than patella I; patella I and femur I subequal. Posterior pair of legs extending beyond the tip of body by about one-half their length.

Length, 0.57 mm.; width, 0.40 mm.

Male.—Unknown.

Type host and type locality.—From a "wild rat" at Urbana, Illinois.

Type.—Cat. No. 906, U. S. N. M.

Described from a female collected from a "wild rat" at Urbana, Illinois, by H. Glasgow, Dec., 1912. Related to *L. californicus*, new species, but coxa II lacks the tooth-like spine.

Laelaps virginianus, new species.

Female.—Chelicerae with chelae about equal, both hooked at the tips; movable chela with three teeth, fixed chela with two teeth; seta on chelicera inflated for its basilar half and curved at its tip. First pair of anterior apical setae straight, divergent; second pair recurved and incurved until their apices meet; third pair longer than second and strongly recurved. Sternal pores curved slits, second pair obliquely situated midway between second and third pairs of sternal setae; sternal setae long, slightly curved, subequal and arranged into two divergent rows. Genito-ventral plate with a single pair of setae, extending half way to the anal plate. Anal plate sub-triangular with broadly rounded sides; anus situated about three-fourths its greatest diameter from the front margin of anal plate; paired anal setae situated considerably in front of level of posterior margin of anus; unpaired anal seta longer than paired anal setae and situated at about two-thirds the distance from the anus to the tip of anal plate. First pair of legs much longer than second pair; tarsus I slightly longer than tibia I.

Length, 0.73 mm.; width, 0.42 mm.

Male.—Unknown.

Type host and type locality.—From a "wild mouse" at East Falls Church, Virginia.

Type.—Cat. No. 907, U. S. N. M.

Described from a female specimen taken from a mouse trapped at East Falls Church, Virginia, Sept. 19, 1919, by the writer. This species is related to *L. glasgowi*, new species, but has not the shoulders.

Laelaps reithrodontis, new species.

Female.—Chelicerae moderate; movable chela larger than fixed chela and each provided with two teeth. Sternal plate broader than long and projecting between second and third coxae in the form of long, chitinous cusps. Sternal pores, oblique, curved slits, in their usual position. Sternal setae subequal, in two oblique rows; first pair situated directly on the anterior margin of sternal plate. Genito-epigastric plate extending over half way to anal plate and about as broad as the latter. Anal plate as broad as long; anus situated about two-thirds its greatest diameter from the anterior margin of anal plate; paired anal setae situated about opposite to the middle of the anus; unpaired anal setae situated slightly nearer the apex of anal plate than the posterior margin of anus. None of the coxae with a tooth-like spine. Tarsus I about one and a third times as long as tibia I and with a pseudosegment at the base that is twice as broad as long. Tibia II but slightly longer than patella II.

Length, 0.77 mm.; width, 0.44 mm.

Male.—Not known.

Type host and type locality.—From *Reithrodon cuniculoides* at Huanuluan, Territory of Río Negro, Argentina.

Type.—Cat. No. 908, U. S. N. M.

Described from a single female (holotype) taken from a female skin of *Reithrodon cuniculoides* (U. S. N. M. 238125) collected at Huanuluan, Territory of Río Negro, Argentina.

**ON THE TYPES OF "PYRAUSTA" CAFFREII FLINT & MALLOCH
(LEPIDOPTERA: PYRALIDAE: PYRAUSTINAE).**

BY WM. BARNES AND F. H. BENJAMIN, *Decatur, Illinois*.

Loxostege ("Pyrausta") *caffreii* Flint & Malloch, Bull. Ill. N. H. Surv., XIII, 1920, p. 304, ff. 43-44, (*Pyrausta*).

The type male and allotype female which served for the original description of *caffreii* are before the authors through the kindness of Dr. Frison of the Illinois Natural History Survey. Heinrich (Ent. News, XXXII, 1921, p. 57) is correct in the statement that *caffreii* belongs in *Loxostege* and that the male type is *similalis* Gn. It probably represents the same form as *rantalis* Gn. but the specimen is too rubbed to be sure, and the name *rantalis* has little significance.

The female represents the species going under the name of *obliteralis* Wlk. (*marculenta* G. & R.). The authors are not certain of the identity of the Walker name with that species placed under it (*marculenta*) in all North American collections.

FOUR NEW THYSANOPTERA FROM AFRICA.

By J. DOUGLAS HOOD, *University of Rochester.*

The new species described below were collected by Mr. Arthur W. Jobbins-Pomeroy, Government Entomologist of Southern Nigeria, in 1915, and the descriptions have been prepared and awaiting publication for six or seven years.

All types are in the writer's collection.

Anaphothrips flavidus, new species.

Female (macropterous).—Length about 1.1 mm. Color bright yellow, the seven basal abdominal tergites each with a brown blotch occupying the median half; last two abdominal segments more heavily chitinized, darker laterally, and with orange colored pigment; wings smoky gray, darker along the longitudinal veins; legs concolorous with body; antennæ dark brown, with segment 1 nearly colorless, and segments 3 and 4 yellow, lightly clouded with brown toward apex; ocellar pigment bright red.

Head very slightly longer than wide and slightly longer than prothorax; occiput with a few faint anastomosing lines; bristles minute, colorless. Eyes 0.4 as long as head, 0.8 as long as cheeks, and 0.6 as wide as their interval. Ocelli rather widely separated, forming a nearly equilateral triangle, the center of which is opposite middle of eyes. Antennæ about 1.64 times as long as head, structure normal to the genus; sense cones on third and fourth segments forked, short; sixth segment not divided. Maxillary palpi three-segmented.

Prothorax about 1.3 times as wide as long and slightly shorter than head; pronotum smooth, with a few very minute, transparent bristles on disk, and without bristles at either the anterior or posterior angles. Wings of fore pair with two longitudinal veins extending from base to tip, each vein with a few scattered bristles. Legs rather short and stout.

Abdomen with posterior margin of segment 8 produced dorsally into a comb of slender spines; segments 9 and 10 more heavily chitinized, the latter divided above; bristles as in *A. obscurus*.¹

Measurements of holotype (♀): Length 1.260 mm.; head, length 0.146 mm., width 0.144 mm.; prothorax, length 0.144 mm., width 0.186 mm.; pterothorax, width 0.240 mm.; fore wings, length 0.660 mm., width near base 0.063 mm., at middle 0.044 mm.; abdomen, width 0.240 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	22	33	40	36	35	46	10	13
Width (μ)	26	27	19	18	19	18	8	5

Total length of antenna 0.235 mm.

Male (macropterous).—Length about 0.09 mm. Very similar to female, but smaller, slenderer, and paler. First antennal segment nearly colorless; 2-4 and base of 5, yellow, 2 darker at sides and 4 darker at apex; remainder of antenna dark brown. Abdomen with apical segments more heavily chitinized, and with the last two segments suffused with orange-colored pigment; segment 9 with two pairs of chitinous dorsal projections, those of the posterior pair slightly more widely separated.

¹See Hinds, Proc. U. S. Nat. Mus., Vol. XXVI, 1902, Pl. V, fig. 50.

Measurements of allotype (♂): Length 1.056 mm.; head, length 0.123 mm., width 0.126 mm.; prothorax, length 0.117 mm., width 0.141 mm.; pterothorax, width 0.201 mm.; fore wings, length 0.540 mm., width near base 0.063 mm., at middle 0.041 mm.; abdomen, width 0.201 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	21	30	36	32	32	40	08	12
Width (μ)	24	22	17	16	17	16	7	5
Total length of antenna 0.211 mm.								

Described from one individual of each sex, taken by Lieut. A. W. Jobbins-Pomeroy from *Andropogon tectorum*, at Ibadan, Southern Nigeria, January 11, 1915.

This species is a true *Anaphothrips*, closely resembling *A. obscurus* but more slender and graceful in outline. From the three described African species of this genus—*loennbergi* Trybom, *sudanensis* Trybom, and *alternans* (Bagnall), the latter of which is represented in the material before me by a female cotype in excellent condition, received from Mr. Bagnall—it may at once be known by the yellow color, the uniform gray wings, the long head, and by having the eyes shorter than the cheeks.

***Astrothrips pentatoma*, new species.**

Female (macropterous).—Length about 1.14 mm. Dorsal surface deeply reticulate. Color yellowish brown, with sides of pterothorax and abdominal segments 2–7 dark brown; abdomen paler towards apex, especially medially, and with sides of segments 8 and 9 and apical third of 10, darkened with blackish; antennæ yellow, with segments 1 and 2 darker and segment 5 brownish in apical third; femora brown, somewhat paler apically; tibiae with slender basal portion and apical half or third, yellow, intermediate portion brown, middle tibiæ darkest; tarsi pale yellow; fore wings with a brown band at basal third and one at apical fifth, each interrupted at middle of wing; basal sixth of fore wings yellowish brown, intervening portions darkened along anterior and posterior margins with brown; hind wings light gray-brown, darker toward apex, and with a dark brown median streak from near base.

Head polygonally reticulate, about 1.6 times as wide as long, very slightly broadest across eyes; cheeks nearly straight, slightly converging posteriorly, and abruptly constricted at extreme base to form a neck 0.7 as broad as the distance across eyes; vertex elevated and produced, overhanging insertion of antennæ, and bearing the ocelli, of which the anterior surpasses the front margin of eyes and is directed forward, and the posterior pair laterally. Eyes half as long as head, longer than their distance from the neck, and about one-third as wide as their interval. Antennæ five-segmented, two and one-third times as long as head, and reticulate; segment 1 short, subcylindrical, slightly broader than long; 2 broadest in entire antenna, goblet-shaped, pedicellate; 3 slender, vasiform pedicellate, four times as long as wide; 4 about 0.67 as long as 3 and somewhat stouter; 5 longest in entire antenna and somewhat broader than 4, fusiform and pedicellate; sense cones short and simple.

Prothorax about 1.7 times as wide as long, equal in length to head and similarly reticulate, somewhat broadest anteriorly, sides broadly rounded; pronotum with a broad transverse furrow in front of middle and a pair of large transversely elliptical foveæ behind middle; lateral margin explanate. Pterothorax 0.8 as long as wide and about one and one-third times as wide as prothorax, strongly narrowed behind, sides rounded; mesoscutum polygonally reticulate at sides and behind, remainder with anastomosing striæ converging to posterior portion of median line. Wings of fore pair about sixteen times as long as width at middle, which is slightly more than half the greatest subbasal width; ring vein reinforced along anterior and posterior margin by the complete fusion with them of the two principal veins; bristles on fore wings stout, heavy, broader at middle than at base, and more or less blunt, nearly as long as width of wing at middle, those on the dark transverse bands nearly black, costal margin with about 13, anterior vein with 7 beyond fork, and posterior vein with 10; anterior margin of fore wings near base with a ventral brush of about nine hairs. Legs slender, reticulate, hind pair longest.

Abdomen wider than pterothorax, strongly and sharply constricted beyond base of segment 2, which is the longest in entire abdomen; 10 tubular, three-fifths as wide at base as long, not constricted near base, divided in entire length above by a longitudinal suture; sides of basal tergites deeply reticulate, except 1, which is smooth, and 2, which is asperate; dorsum of 9 and 10 lightly polygonally reticulate; bristles minute, those on segment 9 and the stouter pair at apex of 10 less than one-third as long as the latter segment.

Measurements of holotype (♀): Length 1.140 mm.; head, length 0.110 mm., greatest width 0.180 mm., basal width 0.124 mm.; eyes, length 0.056 mm., width 0.036 mm., interval 0.102 mm.; prothorax, length 0.113 mm., width 0.194 mm.; pterothorax, width 0.264 mm.; abdomen, greatest width 0.317 mm.; segment 10, length 0.098 mm., width at base 0.060 mm.; fore wings, length 0.648 mm., width at middle 0.041 mm., near base 0.073 mm.

Antennal segments:	1	2	3	4	5
Length (μ)	24	39	68	46	84
Width (μ)	26	33	17	18	19

Total length of antenna 0.261 mm.

Described from one female taken by Lieut. Arthur W. Jobbins-Pomeroy at Ibadan, Southern Nigeria, in a flower of *Phaseolus lunatus* L., January 27, 1915.

Readily known by the five-segmented antennæ.

***Liothrips genualis*, new species.**

Female (macropterous).—Length about 1.7 mm. Color blackish brown; antennal segments 2–5 brown, successively darker, each more or less clouded; 6–8 dark blackish brown; tips of femora, both ends of fore tibiæ, and all tarsi, yellow; fore wings light brown, with a pale longitudinal streak in posterior third; hind wings slightly paler than fore wings and with a dark median streak in basal two-thirds.

Head about 1.14 times as long as wide, cheeks straight and parallel; vertex slightly produced, the anterior ocellus directed forward and upward, very

slightly overhanging; dorsal and lateral surfaces distinctly transversely striate with anastomosing lines and with a few minute bristles; postocular bristles capitate and about equal in length to eyes. Eyes about 0.36 times as long as head and not protruding. Posterior ocelli slightly in front of a line drawn through middle of eyes. Antennae twice as long as head, of the general form and structure common to the species of the genus, segments 7 and 8 rather closely united; sense cones disposed as follows: 3, 0-1; 4, 1-2; 5, 1-1 +1; 6, 1-1 +1; 7 with one on dorsum near apex. Mouth cone long, acute, attaining base of prosternum.

Prothorax along median dorsal line about 0.7 times as long as head and (inclusive of coxæ) about 2.5 times as wide as long; all bristles present, long, capitate, the two pairs at the posterior angles longest and subequal; coxal bristle about equal in length to anterior angular. Pterothorax slightly wider than prothorax, sides slightly arcuate. Wings long, less closely fringed than usual, of nearly the same width throughout; fore pair with the three subbasal bristles capitate and about equal in length to the two pairs on anterior margin of prothorax, and with eight or nine accessory hairs on posterior margin. Fore tarsi unarmed.

Abdomen of normal form, large and heavy, wider than pterothorax. Tube about 0.8 as long as head and very slightly more than twice as wide at base as at apex, sides straight. Lateral abdominal bristles capitate in part, those on apical segments about 0.8 as long as tube, all bristles on segment 9 pointed; terminal bristles equal in length to tube, brown.

Measurements of holotype (♀): Length 1.66 mm.; head, length 0.228 mm., greatest width 0.199 mm.; eyes, length 0.082 mm., width 0.060 mm., interval 0.067 mm.; postocular bristles, length 0.079 mm.; prothorax, length 0.156 mm., width (inclusive of coxæ) 0.396 mm.; pterothorax, length 0.396 mm., width 0.406 mm.; abdomen, greatest width 0.444 mm.; tube, length 0.186 mm., width at base 0.096 mm., at apex 0.046 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	45	60	66	65	67	60	54	37
Width (μ)	44	37	34	36	34	33	27	15

Total length of antenna 0.454 mm.

Described from one female taken by Lieut. A. W. Jobbins-Pomeroy on *Bougainvillea glabra* at Ibadan, Southern Nigeria, January 11, 1915.

The North American *L. leucogonis* is the only other species of the genus in which the knees are described as pale. The dark wings of the present species are also an unusual character.

***Liothrips badius*, new species.**

Female (macropterous).—Length about 2 mm. Color chestnut brown, with head, apical abdominal segments, and basal half of tube darker; segment 3 of antennæ distinctly paler in basal two-fifths, segments 4-6 slightly paler basally; legs concolorous with body, except tarsi, which are yellowish; wings brown, the fore pair with a darker median streak extending from the region of the three subbasal bristles to tip of wing, this streak margined posteriorly with a narrower

colorless one, the latter about equal in width to a second brown streak forming the posterior margin of wing; hind wing with a narrower dark streak extending from base to apex, broadly margined anteriorly with paler.

Head about 1.37 times as long as wide, cheeks straight and parallel; vertex slightly produced, the anterior ocellus directed forward and distinctly overhanging; dorsal and lateral surfaces finely but distinctly transversely striate with anastomosing lines and with a few very minute and indistinct bristles; postocular bristles unusually short and inconspicuous, less than one-third as long as eyes, pointed. Eyes about 0.38 as long as head, not protruding. Posterior ocelli distinctly in front of a line drawn through middle of eyes. Antennæ twice as long as head, unusually slender, segments 7 and 8 rather closely united; sense cones long and slender, disposed as follows: 3, 0-1; 4, 1+1-2; 5, 1-1+1; 6, 1-1+1; 7 with one on dorsum near apex. Mouth cone attaining base of prosternum, the labrum surpassing the broadly rounded labium.

Prothorax along median dorsal line about 0.52 as long as head and (inclusive of coxæ) about 2.5 times as wide as long; all bristles present, blunt or slightly capitate, dark brown in color, the two pairs on anterior margin about equal in length to postoculars, the others more than twice as long and subequal in length; coxal bristle somewhat shorter and more slender than midlateral. Pterothorax distinctly wider than prothorax, sides slightly arcuate. Wings long, of nearly the same width throughout; fore pair with the three subbasal bristles slightly capitate and subequal to midlateral, and with nine or ten accessory hairs on posterior margin. Legs long and slender; fore femora not at all swollen; fore tarsi unarmed.

Abdomen of normal form, large and heavy, wider than pterothorax. Tube 0.83 as long as head and twice as wide at base as at apex, sides straight. Lateral abdominal bristles stout, dark brown, and conspicuous, similar to the larger ones on prothorax, with the exception of those on segment 9 which are slender, pale, and pointed, and those at apex of tube, which are slender, brown, pointed, and about 0.8 as long as tube.

Measurements of holotype (♀): Length 2.04 mm.; head, length 0.288 mm., greatest width 0.210 mm.; eyes, length 0.111 mm., width 0.072 mm., interval 0.069 mm.; postocular bristles, length 0.031 mm.; prothorax, length 0.151 mm., width (inclusive of coxæ) 0.373 mm.; pterothorax, width 0.456 mm.; fore wing, length 1.14 mm., width at middle 0.108 mm.; abdomen, greatest width 0.550 mm.; tube, length 0.240 mm., width at base 0.093 mm., at apex 0.046 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	51	65	87	87	91	86	71	45
Width (μ)	42	34	29	32	29	29	24	14

Total length of antenna 0.583 mm.

Described from one female taken by Lieut. A. W. Jobbins-Pomeroy in Kamerun, December 12, 1915, by sweeping.

The long head and general facies are suggestive of such species as the North American *Liothrips citricornis*. It may readily be known, however, by the coloration of the wings and antennæ, the unarmed fore tarsi, and the minute postocular bristles.

A NEW TACHINID PARASITE OF A COCOANUT MOTH IN SOUTH ASIA (DIPTERA).

BY J. M. ALDRICH.

The parasite described below appears to have considerable economic importance as it has been reared in large numbers from a very injurious moth.

Ptychomyia remota, new species.

Resembles *Ptychomyia selecta* Meigen, type of the genus, in size and the following characters (I have only the female of *selecta*, one European specimen determined by Brauer and Bergenstamm, for comparison): eyes and parafacials bare; ocellar bristles proclinate, far apart, located a trifle below the level of the anterior ocellus; third antennal joint long, nearly five times the second in the female, penultimate joint of arista about three times as long as thick; facial ridges with strong erect bristles almost up to arista; facial depression deep; bucca (below eye) narrow. Third vein with strong setules at base, usually extending nearly to the crossvein. Four dorsocentrals, three sternopleurals; mid tibia with two bristles on outer front side, the upper one smaller; hind tibia with irregular row on outer extensor side; female with last abdominal segment in the form of a short, blunt cone.

Differs from *selecta* in having yellow palpi, a pair of small apical scutellars directed backward besides the three lateral ones; no discal abdominal macrochaetae.

Color black, except palpi. Front in both sexes .31 of the head-width (two males and two females all measured the same by micrometer); parafrontals, mesonotum and basal half of abdominal segments 2-4 with golden-yellow pollen; parafacials silvery, at narrowest less than half as wide as third antennal joint; bucca hardly one-tenth of eye height; frontal bristles rather far apart, only about seven in number, the lowest almost meeting the row on facial ridge. Apical half or more of abdominal segments 2-4 shining black, the basal pollinose bands interrupted in middle.

Length 4.5 to 5 mm.

Described from 19 males and 13 females, bred from larvae of *Artona catoxantha* Hampson, a zygaenid moth seriously attacking cocoanuts, in the Federated Malay States. Received from B. A. R. Gater, office of Secretary for Agriculture, Federated Malay States and Straits Settlements. Eight paratypes are returned to Mr. Gater and others are deposited in the British Museum and the collection of Professor M. Bezzi, Turin, Italy.

Type.—Male, Cat. No. 27,739, U. S. N. M.

DESCRIPTION OF WINGED ADULT OF KALOTERMES APPROXIMATUS SNYDER (ISOPTERA).

BY THOS. E. SNYDER, *U. S. Bureau of Entomology.*

Winged adult.—On August 23, 1924, the writer found at Cape Henry, Va., winged adults of *Kaloterme approximatus* Snyder in the same tree that the soldier was found on December 15, 1923, and in the same locality where the dealated adult was collected on April 7, 1923. Most of these winged forms had attained mature color and were with soldiers and nymphs in the inner heartwood near the center of the tree or core. The dark color and black wings distinguish these winged forms from all other species of *Kaloterme* except *K. minor* Hagen from the Pacific Coast. The winged adult of *K. approximatus* is smaller than *minor*. The following is a detailed description of the winged adult as well as additional notes on the soldier caste.

Antennae 16 segments.

Wings blackish, membrane smoky, punctate; costal veins blackish; in forewing subcostal vein with 10–11 branches to costal vein, the first 7 being fairly long; median vein runs about half way between subcosta and cubitus, branches beyond over half length of wing, reaches apex; cubitus does not reach apex, with 13 branches or sub-branches to lower margin of wing, occupies less than one-half wing area (in width). In hind wing, subcostal vein with 5 branches to costal vein, mostly very long; median vein slightly nearer to cubitus than to subcosta, branches at about basal one-third of wing, reaches apex; cubitus with about 10 branches or sub-branches to lower margin of wing.

Measurements:

Length of entire winged adult: 9.50 mm.

Length of entire dealated adult: 7.50 mm.

Length of fore wing: 6.75 mm.

Width of fore wing: 2.10 mm.

Soldier.—Antennae with 13–15 segments. Right mandible with marginal denticles from marginal teeth to tip.

CHANGE OF A PREOCCUPIED NAME (LEPIDOPTERA: AEGERIIDAE).

BY WM. BARNES AND F. H. BENJAMIN, *Decatur, Illinois,*

***Melittia lindseyi*, new name.**

Melittia superba Barnes & Lindsey, Bull. Brooklyn Ent. Soc., Vol. 17, 1922, p. 122.

Mr. August Busck has informed the senior author that the name *superba* is preoccupied in *Melittia* by *superba* Rothschild, 1909, Novitates Zoologica, XVI, 132.

TWO NEW MEXICAN CERAMBYCIDAE (COLEOPTERA).

BY W. S. FISHER, *U. S. Bureau of Entomology.****Eupogonius knabi***, new species.

Male.—Elongate, subcylindrical, uniformly reddish-brown above, densely clothed with short recumbent yellowish-white pubescence (slightly denser on sides of pronotum than at middle), nearly concealing the punctures, and with numerous rather short erect hairs arising from the punctures; beneath similar to above, but the surface has a mottled appearance, and the erect hairs are slightly longer.

Head strongly transverse and feebly convex in front, feebly concave between the antennal tubercles, which are slightly elevated, and the surface rather densely, coarsely and irregularly punctate; eyes coarsely granulated, very deeply emarginate, and separated from each other on the top by about the width of the emargination of the eyes in front. Antennae a little longer than the body, robust, reddish-brown, and densely clothed with short recumbent cinereous hairs, except the apical half of the tenth, and basal two-thirds of the eleventh joint, which are clothed with brown pubescence; in addition the first four joints are densely clothed on all sides with rather long erect hairs, while the following joints are only sparsely clothed with similar hairs on the under side; first joint short, subcylindrical, slightly more robust than the second, and three-fourths as long as the third joint, which is subequal in length to the fourth, the following joints considerably shorter, and subequal in length, except the last two, which are shorter. Pronotum as wide as long, base and apex about equal in width; sides nearly parallel, with a very short obtuse tooth on each side at the middle; surface regularly convex, slightly uneven, and sparsely, coarsely and irregularly punctate. Elytra three and one-fifth times as long as pronotum and considerably wider than it at base; humeral angles broadly rounded; sides feebly obliquely attenuate to apical fourth, then arcuately attenuate to the tips, which are separately, rather narrowly rounded; surface irregularly punctate, the punctures coarse and rather closely placed in the basal region, but becoming much finer and widely separated toward the apex. Abdomen beneath sparsely, coarsely, but obsoletely punctate, and finely granulose; last segment broadly arcuately, but not deeply emarginate at apex. Femora strongly swollen toward apex. Tibiae rather robust, more or less flattened, and enlarged at apex, the median ones distinctly grooved. Tarsi broadly expanded.

Length 9 mm.; width 3.2 mm.

Type-locality.—Vera Cruz, Mexico.

Type.—Cat. No. 27893, U. S. N. M.

Described from one male collected at the type-locality, December 16, 1907, by Frederick Knab.

This species is related to *comus* and *ursulus* described by Bates, which have the first four joints of the antennae densely clothed with long hairs on all sides, while the following joints are only ciliated on the under side. From the former it differs by not having the black markings on the elytra, and the pubescence on the antennae of a uniform color, and from *ursulus*

it can be separated by the pubescence on antennae of a uniform color, and the fifth to eleventh joints not dilated on the one side.

Eupogonius marmoratus, new species.

Female.—Elongate, uniformly piceous above, sparsely clothed with very short recumbent yellowish-white pubescence, and small, widely separated patches of denser and longer cinereous hairs, and with numerous long erect setae arising from the punctures; beneath reddish-brown, the legs more or less rufous, and the surface sparsely clothed with short recumbent and long flying cinereous hairs intermixed.

Head strongly transverse and feebly convex in front, flat between the antennal tubercles, which are scarcely elevated, and the surface sparsely, coarsely and irregularly punctate; eyes coarsely granulated, deeply emarginate, and separated from each other on the top by twice the width of the emargination of the eyes in front. Antennae about as long as the body (right antennae missing), uniformly dark brown, sparsely clothed with short recumbent brown pubescence, except the last seven joints, which are narrowly annulated with whitish pubescence at base; in addition the joints are densely clothed with moderately long erect hairs; first joint short, robust, subclavate, and about three-fourths as long as the third joint, which is subequal to the fourth, the following joints much smaller, and nearly equal in length. Pronotum as wide as long, apex and base about equal in width; sides nearly parallel, with a short, acute tooth on each side at the middle; surface regularly convex, somewhat uneven, obsoletely transversely depressed near base, and rather sparsely, very coarsely and irregularly punctate. Elytra three and three-fourths times as long as pronotum and considerably wider than it at base; humeral angles broadly rounded; sides feebly obliquely expanded to apical third, then arcuately attenuate to the tips, which are separately, rather narrowly rounded; surface rather densely and irregularly punctate, the punctures coarser in the basal region, but becoming finer toward the apex. Abdomen beneath obsoletely punctate and granulose; last segment broadly rounded at apex. Femora strongly swollen at middle. Tibia slender, cylindrical, not enlarged at apex, and the middle ones not distinctly grooved. Tarsi narrow.

Length, 5 mm.; width, 1.5 mm.

Type locality.—Cordoba, State of Vera Cruz, Mexico.

Type.—Cat. No. 27894, U. S. N. M.

Described from one female collected at the type-locality, February 5, 1908, by Frederick Knab.

This species is allied to *subnudus* described by Bates from Guatemala, but differs from that species in having the head and pronotum sparsely clothed with yellowish-white pubescence, and the last seven joints of the antennae narrowly annulated with cinereous pubescence at base.

Actual date of publication, February 10, 1925.

EDITORIAL.

Insects are good for many things. They are good for entomologists, as most any one is willing to admit. They are also good for humanity as a whole, a fact not so thoroughly appreciated. Most people consider them (when they consider them at all) merely as nuisances; but they are much more. They are redoubtable enemies who do us a real service by forcing us to fight them for dominion of the world. Much of our natural cussedness, that otherwise would be turned against mankind, is expended in a legitimate defensive war. Under the continuous and unrelenting insect onslaught our ingenuity is taxed to find newer, better and less wasteful methods of production to keep up with our needs and at the same time make good the losses of insect depredation. Moreover, we are compelled to study the insects themselves and thus learn, whether we will or no, something more of the real world in which we live. They might also serve to point a moral for those who have eyes and see not, for those restless officious creatures who are solely intent upon the practical and ever seeking new ways of making us more efficient and uncomfortable.

We are told to consider the ant and the bee, how they toil from morning until night and know no better, and how in consequence they achieve a superlative order in their societies. It would be well if we did; for we should learn some things not to do. It would be well too if we also considered the butterfly who labors not nor makes efficient intricate societies, yet who has his hour of beauty in the sun and enjoys a freedom unknown to bee or ant.

The moral has an obvious application in the larger world. It has quite as pertinent though not so obvious a one in the world of science. Efficiency is not everything. Practical values are not the only values. Indeed if all that science can give us is the efficient and practical, it can give us very little. We need something more even as scientists; and that something we get from those who are essentially neither efficient nor practical. Not that they are inefficient or unpractical or mere obstructionists. They are simply unproductive in material works. They do not publish books nor perfect systems. They are of those whom we prize for what they are rather than for what they do, naturalists rather than specialists, lovers of Truth who live with her apart and are subject to no other necessity. We others are judged like the bees and the ants for what we do and how we do it; but these rather as the butterflies, for themselves. They also serve because they keep alive the spirit of liberty—without which science would die.

—*Carl Heinrich.*

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ADDRESS OF THE RETIRING PRESIDENT.

BY ADAM G. BÖVING.

A SUMMER TRIP IN ICELAND SOUTH OF VATNA-JÖKUL.¹

The southeastern part of Iceland is covered by an immense ice plateau, "the Vatna-jökul." A mighty mountain range of gray and black basalt follows the coast line. Its upper ridges and peaks are capped with snow and near the top there are cracks and deepenings in the sides of the mountains filled with snowdrifts. Farther down are many brooks and waterfalls, looking from the distance like shining silver bands. On the terraces and hills at the foot of the mountains where the ground is moist and contains sufficient humus are a number of fresh, green grass-fields. Here the farmhouses of the Icelandic settlers are built. Through passages in the mountain range the glaciers from the interior ice plateau descend to near the Atlantic ocean, plowing up the underground and forming a typical moraine landscape. In the intervening area between the ocean and the foot of the glaciers, or the foot of the mountains, are extensive flat and low plains of sedimentary sand and gravel, deposited in enormous quantities by the rivers coming out from under the bottoms of the glaciers.

All these conditions as they exist here to-day, are very similar to those that prevailed in the regions south of the mountains of Norway and Sweden during the prehistoric glacial periods and from which not only Denmark but most of the low-lands of middle Europe originated.

Unquestionably, for the discussion of many of the problems pertaining to this remote period it would be most profitable to study the correspondent recent phenomena in Iceland. No investigation, however, had ever been undertaken here by any geologist, of Danish or other nationality, familiar with the glacial questions of Europe, except by the famous Icelandic geologist Thoroddsen, who had travelled frequently in these localities and written about them. Therefore when the Danish

¹The material collected on this trip has not been worked up scientifically and no technical account has been published on the results. All the botanical and zoological names given in the present paper are from my diary and are to be considered merely as preliminary field determinations.

geologist, Dr. Poul Harder, in the beginning of the year 1908 suggested a geological and biological expedition to be sent to Iceland, southeast and south of Vatna-jökul the University of Copenhagen favored the project and it was decided that Dr. Harder himself should be the leader of the undertaking. At that time I was studying in England but Dr. Harder wanted me along with him to collect plants and insects, and it was therefore arranged that I should join the expedition at Leith, Scotland.

We had to bring everything with us from Copenhagen: two tents with tent-poles, a theodolite, a large camera and other instruments, nets, vials, labels, alcohol, pins and miscellaneous implements, bags of rice and oat flakes, tinned meat, soup, fruit and butter, clothing, wooden shoes, etc., all carefully packed in solid, waterproof wooden boxes. Each box, with the full contents, weighed one hundred pounds and was ready to be hooked onto the saddles of the pack-horses, one box on each side of the horse, carefully adjusted to balance well. Only the horses had to be bought in Iceland and this had been arranged for by the merchant in Hornefjord.

The 13th of June we sighted land. The air was bitterly cold but very clear. The sea was dark blue. A single whale was swimming near the coast and a pair of eider-ducks were headed for the mainland flying close over the top of the waves. The lower parts of the coast mountains were seen through a thin haze, but above, the grey and black basalt was fully illuminated by strong sunlight and the snow on the top was gleaming. We went ashore at the small hamlet of Berufjord. Here we found our baggage in good order and the horses waiting for us, eleven pack and three riding horses, one of the latter for Dr. Harder, one for myself and one for an Icelandic student, Gislarsen, who was employed as our helper and interpreter.

The language spoken on Iceland nowadays has changed very little from the old Norse in which the Sagas were written, while the other Scandinavian languages, Danish, Norwegian and Swedish, which all have developed from this same original tongue, now differ so much from it that it is absolutely necessary to use an interpreter in dealing with Icelanders who only speak their mother tongue.

To travel in this part of Iceland is difficult and inconvenient as there are no roads, no bridges and the only possible way of communication is by horse-back riding. One is exposed to all kinds of hardships especially during the crossing of the streams and rivers as these continually change their courses and their depth varies all the time. Usually the horses can pass by wading but often they will have to swim. It is also risky to undertake the journey through these bare and dismal regions without a very definite knowledge about the distribution and size of the grass fields on which one must depend for food for the horses.

In this latter respect, however, we were very fortunate, having at our disposal detailed maps of the whole territory, which showed not only an elaborate system of altitude-curves, the size and location of the glaciers and the rivers, but also the lay of the farmhouses and the pastures. The maps were published by the Danish War Department after a most strenuous and difficult surveying under the leadership of the intrepid arctic explorer Capt. Kock. They had just been finished the year before our expedition started.

From Beruffjord we started immediately for Hornefjord which was chosen as the first and most eastern station of our working field. It is south of Beruffjord and to reach it we had to pass over mountains of the coast range rising to an altitude of about 1200 feet. The trip took us three days. The local guide, Gunnar from Tingnäs, was at the head of the expedition. He conducted the first packhorse, which was followed by the rest in a long-row. Each horse was tied to the tail of the one in front of it by a rope from its head-gear. Harder and I brought up the rear.

“LOENS-HEDE”

One of the Mountains of the Coast Range.

This is a terribly desolate locality. The vegetation is extremely poor and low; a little bit of moss here, a thin tuft of grass there, but mostly bare, black basaltic rock wherever you look. Only in a few protected spots grew small blocks of the beautiful white *Dryas octopetala* (“the mountain anemone”), of *Silene acaulis*, *Saxifraga oppositifolia* and a small reddish-blue cruciferous plant. There were no hares or other mammals, no ptarmigans, or ravens or birds of prey, and apparently no insects of any kind. The metallic clattering of the horse-shoes against the rocks, the rattling of the boxes and the constant sharp shouting of the guide to the animals broke in a weird and ghostly way the monotony of the perpetual oozing and dripping of the water in the chilly and dead nature.

At last we reached the crest of the mountains and came close to the fields of the perpetual snow. They were not gleamingly white as they had appeared from a distance but the surface was dirty and dingy from blackish basaltic dust. In one place the ponies sank down belly-deep and there was water beneath the snow.

On our way down the cold air rather suddenly became very damp. We were in the midst of one of the thick, solid looking, whitish clouds which we had seen hanging around the peaks or slowly rolling down the mountain sides, covering and concealing everything. The descent, however, was free from danger and very easy. An immense conical talus of loose débris from the solid rock spread itself out, clothing the sides of the mountain

like a gigantic train. A narrow slanting riding-path ran obliquely from the top of the talus all the way down to the valley where the farmhouses and pastures were. It was eleven o'clock in the evening when we arrived here, but it was as light as it had been at noontime. The thermometer showed 7° centigrade.

“SVINAFELD”

One of the Mountain Valleys at the Foot of the Coast Range.

Svinafeld is a broad valley, with an elevation of about 50 meters above the sea-level, well sheltered toward the northeast and the southeast by moss-clad mountain sides. It was the most charming spot I saw on Iceland. The sky was very clear and the temperature at noon about 20° C. It was Sunday when we arrived. I am sure that this is correct; though to keep track of day and date was one of the things that sometimes caused us trouble, far away from civilization as we were, without regular mail and most of the time all by ourselves. The valley was carpeted with green grass and dotted with *Galium*, *Pedicularis flammea*, *Cerastium*, *Saxifraga oppositifolia*, a conspicuous purple *Geranium*, *Erigeron*, *Rumex*, *Thymus*, *Polygonum viviparum*, *Campanula uniflora* with one or two flowers, a light violet *Gentian* and the yellow arctic *Papaver nudicaule*. Here and there were blackberry-bushes in flower. In several places the pasture was overgrown with a foot high scrub of birch (*Betula odorata pubescens*). Between the birches grew the woolly willow (*Salix lanata*) and also *Salix glauca*, both of about the same height as the birches. Below the brush the *Poa* and *Agrostis* grasses were long, fine and fresh. In the background a sizeable brook wound its way down from the moss-clad rock, but gradually disappeared in a beautiful meadow where grew a multitude of various plants: in the wetter parts, *Carex*, *Juncus*, *Eriophorum*, *Luzula arcuata*, *Equisetum*, *Hypnum* and *Menyanthis*; on less swampy ground, a little greenish-white Orchid, the insectivorous *Pinguicula vulgaris*, the glorious green and white *Parnassia palustris*, *Caltha palustris* with large, shiny, yellow blossoms, *Dryas octopetala*, *Silene acaulis*, *Potentilla rupestris* and *Arctostaphylos* in flower but with dried berries from last year still hanging on it.

There are no butterflies on Iceland, only dark colored moths such as *Hadena maillardi* and different species of *Agrotis*. These were flying around lively in the blazing sunlight and were so occupied sucking honey from the different flowers, favorite among which is *Thymus*, that it was very easy to catch them even with the fingers. An inconspicuous Geometrid, probably *Larentia thulearia*, flew in great numbers around the birches. It is lively and elusive. The leaves of the birches were greatly damaged by a grey-blue Tortricid larva which spins three or four of the leaves together, skeletonizing them from the inside and eating the top shoot. Is it to protect themselves against

rain that they do so, or against the numerous parasitic wasps which are seen everywhere? The large black and yellow banded Dipteron, *Sericomyia lappona*, quick as lightning, buzzed around and several pretty, metallic species of *Syrphus* hung hovering in the air, now in sight and now away. Often they were seen resting on the sticky leaves of the birches and licking the sweet exudations. The wooly willow (*Salix lanata*) was damaged by a large black Geometrid-larva with two white stripes on the back and also by *Notaris acridulus*?, a small Curculionid with a pointed snout. On the leaves were the fresh marks of gnawing and the fine excrement of this weevil. The female eats a hole in the tip of one of the end-buds depositing an egg here, and afterwards the larva tunnels through the soft shoot in its entire length but stops as soon as it comes to the hard wood from the year before. The leaves on the sides of the young shoot wither and shrivel to a bulb-like body, which in a short while drops to the ground. One would expect the larvae to pupate inside of the bulb but I never found any pupae there. On the contrary I found several of the larvae about two inches down in the ground. These were placed in a jar with the soil in which they were found and four of them developed into imagines.

Black larvae of *Gonioctena viminalis*, newly hatched and about 7 mm. long, were feeding on the leaves of the same species of *Salix*, skeletonizing them in spots and leaving the epidermis intact on one of the sides. There were also the long white eggs of this Chrysomelid on the leaves but only a single imago was taken in the open; many, however, were found under stones. Altogether the results from turning stones were very satisfactory. Several Carabids were hidden below them, such as *Platysmia frigidus*, *Calathus melanocephalus* with its characteristic rust-colored thorax, *Harpalus fulvipes*, and *Nebria gyllenhalii*. There were a few small Carabid-larvae belonging to the genus *Bembidium* but I did not find the larvae of any of the larger Carabidae. The females, however, were full of eggs and several couples were taken in copula. Under the stones were found several small Staphylinids (among them *Omalium rivulare*, some *Atheta* species and *Tachinus collaris*), all stages of the click beetle *Cryptohypnus riparius* (the imagines covered with little red larvae of the arctic mite *Erythraeus phalangioides*), the imagines of the bean-like *Byrrhus fasciatus* and *Byrrhus pilula*, *Cytilus varius* related to *Byrrhus*, the dark weevil, *Otiorrhynchus arcticus*, and at least two other species of this genus. Almost everywhere on our trip, and in some localities of widely different character, I found the two species of *Byrrhus* and *Otiorrhynchus arcticus*. The larvae of the latter species were taken on the roots of different sort of grasses and once I found an imago feeding on the leaves of *Polygonum viviparum*, eating from the margin toward the middle rib. Feeding on the grass roots were also a number

of white Coccids. A small yellowish red Scolopendra was frequently found under stones, but here I did not see a dark and larger centipede which is commonly found together with it in other localities. Neither were there any of the naked snails of the genera *Limax* and *Arion* or small shell-bearing snails; but all of these forms I found not far from Svinafeld, at Station Fell. On plants in the pasture were the small *Coccinella 11-punctata*, the *Chrysomela staphylea* and (on *Mercurialis perennis*) *Barynotus Schönherri*. Imagines, eggs and newly hatched larvae of *Aphodius lapponum* occurred in sheep-manure. The small *Bombus jonellus*, the only bumble bee on Iceland, was gathering honey and pollen. The conspicuous Icelandic spider, *Araneus folium*, had fastened its vertical web to grass-straw or irregular pieces of small rocks and spun its vase-shaped house at the lower part of the web. Often a cluster of eggs in a specially woven sack were attached at the top of the house.

In the brook itself I could find no signs of life; and larvae of *Ephemeroidea* and the Diptera, *Ephydra* and *Simulium*, so common in similar streams everywhere else, were wanting here. The water contained iron and sulphur as shown by the covering of ochre on the upper surface of the stones in the stream, and this may explain the remarkable lack of insect life. Along the edges of the brook run the rather large, black ground beetle, *Patrobus septentrionis*, and the silky brown *Amara Quenseli*, one or two species of *Bembidium* and *Notiophilus biguttatus*, together with the small, lively Hemipteron, *Salda littoralis*.

In this snug and sheltered valley our tents were pitched. The surveying poles were planted nearby, and saucepans, pots and emptied tin cans laid on the grass. There was no difference between day and night. The darkest period was supposed to be at 2:30 in the morning but at that time it was so light that without difficulty I could pin my insects and make notes. We divided the day according to our meals: at 9 A. M., oatmeal and mashed apples; after the meal, observations in the field around the tent, planning of the day's work, reading of barometer and thermometer, bringing the diary up to date; at 11 A. M. a solid lunch with coffee and cigars; then dressing for work, putting on the heavy boots. Dr. Harder rode on horseback to the glacier Flaua-jökul, at a considerable distance from the valley, and I usually climbed up the mountain to study the flora and fauna of the rocks and ponds. The ponies were hobbled and left to roam around in the grassfields. We worked to 8-9 o'clock in the evening and did not have any meals before that time. Then came dinner, a long talk and indoor work. Before we went to bed we always took a big cup of tea with plenty of rum. It was very difficult to sleep in the bright sunlight without a nightcap. The sleep was peaceful and undisturbed. Not a single mosquito was seen or heard or felt on the whole trip and we were not bothered by *Simulium*.

In the valley were several pools of stagnant water that unquestionably dry up later in the summer. Not far from the tent was one of them. It was about 2-3 feet deep. At 8 P. M. the water was 21° C. and the air 16° C. There was plankton in it, consisting mostly of large, orange-colored Ostracodes and small Copepods. The bottom was firm, clayey and entirely inorganic. Above it was half an inch of soft plant and animal detritus with many small earthworms and Trichopterous larvae in conical, smooth tubes of fine grains of sand. The imagines were flying above the pool. In the water were swimming the water beetles *Colymbetes dolabratus*, *Agabus alpestris* and *Hydroporus nigrita*, and also the water boatman, *Arctocorixa carinata*; no molluscs of any kind.

It was to compare the fauna of these marsh-pools with the ponds in the mountains that I made several trips to the latter. A very typical one was located about 150 meters above sea level. I brought with me scraper, plankton nets, a watersweeper, spade, lead, etc. Its depth was 2-3 meters, the temperature of the water the 30th of June was 21° C. and the temperature of the air 18° C. at 2:20 P. M. and 13 $\frac{1}{3}$ ° at 6:10 P. M. This pond does not dry up during the summer which explains its comparatively rich fauna and flora. A small mountain meadow surrounded the pond. Around the edge grew *Carex* and *Eriophorum*, and in the water a broad-leaved *Carex* and beautiful *Menyanthis* in flowers. The surface was free from *Lemna*, algae, etc. On the bottom was found first a layer of débris from the vegetation, and below this loose clay. In the clay lived a multitude of red, tube-constructing *Chironomus* larvae and small fragile earthworms. In the débris were two species of Trichoptera tubes, the same conical and smooth one that we had previously found in the pools and another, more cylindrical one which was made of little pieces of *Carex*, also a large species of the fresh-water snail *Limnaeus* and a small bivalve, *Pisidium*. There were a great number of the water boatman and the same three species of Dytiscids as in the marsh-pools; also many Dytiscid-larvae, especially *Agabus*. The plankton was apparently identical in both water types. Altogether the fauna in the shallow pools in the valley possess no form which does not occur in the deeper mountain ponds and the number of the individuals and of the species represented in the shallow pools was much smaller. This different character of the two faunas depends on the temporary existence of the latter and the perennial nature of the former.

From the valley where the tents were pitched one could look over vast, low plains of gravel and sand to the south and southwest. Toward the west a huge, oblong and rounded mountain obstructed any further outlook. It appeared like a monstrous grey whale, a slimy impassable beast stranded on the shore. In

the clear and pure air one could see the broad crossing ridges rising like ribs and bones under the skin; everywhere the water was oozing out and flowing over the sides. Green mucous patches spotted the bare basaltic masses near the plains. The mountain was veiled in a fine bluish haze, the only indication that it was at a distance.

Hidden behind the mountain was the glacier, "Flaua-jökul," the moraines, and the beginning of the sandy plains with rivers fed from the melting glacier-water.

THE SANDY RIVER PLAINS.

The plains of sand and gravel, profusely strewn with rounded stones of many sizes, slope down from the fertile mountain valleys in broad terraces. The entire vast area has been deposited by water from the glacier. The higher lying terraces are the older ones and no longer flooded; but the lower and younger regions are dry only during the summer months. Even at this time there is in many places a broad and extended network of innumerable streams spun from the glacier to the ocean where they develop a wide, marshy and inaccessible delta. In the spring these become deep and dreaded channels hidden in swollen torrents where for hours no ford passable to horses can be found if indeed they can be found at all. From Hornefjord westward, beyond Skeydurásandr, stretching along the south-eastern coastline for more than 200 kilometers, these plains form a narrow strip of land between the highland and the ocean.

To canter over them was a great experience. Never before or after have I cherished a similar romantic and thrilling feeling of unlimited freedom as in those bright days. The common "skuas" or arctic predaceous gulls (*Lestris catarrhactes*) were everywhere, but never in flocks. Croaking and clucking like angry hens, one or two at a time, they would circle around us in low flight like hawks, trying to strike us or our galloping ponies with their wings.

Before we became accustomed to it, it was a most strange and disagreeable sensation to cross the wide rivers with all our horses tied together in one long row. The water flowed fast and the opposite low bank could not be seen. Of course we were riding right through, but it seemed as if the horses were making no headway and all the time were stepping sideways up against the current. When we were in the middle of the river and the water was reaching above the belly of the animals I know that at least I had no idea which way we were headed; the train seemed to go around in a circle all the time. With the boots out of the stirrups and the knees lifted high so as not to become entangled if the horse should stumble, I realized in resigned fatalism my

complete helplessness. I was in the power of the "nökken," the troll of rivers and tarns.

In the older, higher and dryer areas of the plains the stones had a different color from those in the younger and lower areas, being more yellow or greenish gray. This is due to their longer exposure to the air and consequent oxydation. No continuous vegetation covered the bare ground, but plants grew few and far between among the stones. Most characteristic were the grass tufts of *Festuca*, and the cushions of *Thymus*, *Silene acaulis* and *Hypnum* moss. *Potentilla*, *Leontodon*, *Cerastium* and *Draba* were present but not common.

In the lower areas the former river channels could always be distinguished from a distance as long, reddish, winding bands, the color originating from the flowers of the grass; but near by, no reddish color was noticed, and the ground was green with the leaves of the grass, the herbs and the dense carpet of moss. A great variation of plants grew here such as the beautiful little fern *Botrychium*, *Carex*, a few dwarfish willows, *Polygonum viviparum*, *Ledum*, *Arabis*, *Cerastium*, *Armeria* and *Taraxacum* (Dandelion).

In some places where the channels were several feet deep they still contained water in oval pools. The water was clear and fairly warm, about 16° C. These pools were filled with typical water and swamp-plants such as the filose Confervae, the globose *Nostoc* balls, *Sphagnum*, *Eriophorum*, *Glyceria maritima* and strong, fine plants of *Pinguicula*.

Near the ocean the country becomes more and more marshy, and the reddish bands run together making a uniform reddish sod in which the same plant types were found as in the channels.

The animal life of the higher areas of the plains was extremely poor. A few *Notiophilus* and in some places small companies of a little brown Hemipteron were seen running over the sand. *Byrrhus* and *Otiorrhynchus arcticus* were found under the scattered tufts of grass and *Thymus*. The larvae of *Otiorrhynchus* were feeding on the grass-roots. Around the flowering *Thymus* different kinds of Syrphids and *Calliphora erythrocephala* were buzzing and at least two species of *Agrotis* were active, sucking the honey; but most of these insects were unquestionably incidental visitors coming from the mountain pastures.

In the dry parts of the lower regions the insects were the same as in the higher regions, only even scarcer. In the small pools, however, there was a surprising amount of life and here a true ecological association of different forms was displayed. Chironomid larvae in tubes of slimy dirt almost covered the submerged stones. On the bottom, the common trichopterous larvae in conical smooth sand-tubes were crawling slowly around. Swarms of their clumsy, brown spotted imagines whirled and fluttered in the air, and together with them were the imagines

of the Chironomids and a small whitish moth. The imagines of the water beetle *Agabus alpestris* were common. Usually they were found standing vertically in the water with the head right down and moving in quick, short jerks. They fed on the Chironomid larvae on the stones. There were also Ostracods and numerous *Limnaeus* snails. *Salda* was running on the water's edge. Occasionally in the larger pools one of the peculiar small wading birds, *Phalaropus hyperboreus*, was seen swimming around, feeding on insect larvae, Ostracods and other water animals not being too large to swallow.

"FLAUA-JÖKUL."

Plants and Insects in the Old and Recent Moraines.

For the last half century the glaciers have been moving backward in that part of Iceland which we were studying. In this period, however, the retrograde movement of the ice has not been unceasing and continuous. On the contrary, the movement has been oscillating. For a while the front wall of the glacier was on a standstill. Then for a series of years it receded. Again it did not change location for another series of years. Then it advanced for a while over the ground which it had just uncovered; but afterwards the backward motion was reiterated, and so forth.

Gigantic terminal moraines are formed during the periods of rest in which the melting processes of the ice equalize the forward movement of the entire glacial system. Hills of immense stones, huge pieces of ice, smaller stones, gravel, sand and clay, saturated with water, all mixed together without stratification are unloaded at the foot of the towering walls and overhanging cliffs of ice.

Thus during the general retrogradation of the glacier several parallel series of terminal moraines are created. In many localities these are easily distinguished and in one place, at station "Fell," Dr. Harder was fortunate enough to obtain definite chronological records of the ages of the different moraines and the various movements of the glacier from the year 1869 to the year of our expedition.

Here at "Fell" the basaltic rocks, the fertile mountain-valley and the old river-plains look strikingly like the corresponding geological formations at "Svinafell" with which we just have been dealing; and the glacier, "Breidamerkur-jökul," is not very different from the glacier "Flaua-jökul" west of the whale-like mountain at "Svinafell." At "Fell," however, two low moraines are found to define the higher and lower terraces of the plains, indicating where the glacier formerly stood at the end of two different periods which, according to information obtained, were in 1873 and 1886. With these two periods

given, it became possible, by a fortunate coincidence of causes, to synchronize both the ages of the terraces themselves and their fauna and flora, as follows: 1. The river which now flows close to the foot of the present glacier has moved with the ice from the east-most of the two moraines to its present bed, and consequently the ages of the two terraces are determined by the years of the moraines and are respectively from some time before 1873, and from between 1873 and 1886. 2. In 1873 the river completely destroyed the grassfields formerly growing here, as proven by the large flakes of dead and often overturned sod now scattered all over the higher terrace. Thus it can be definitely stated that the vegetation and the fauna migrated into the higher terrace after 1873 and into the lower terrace mainly after 1886. In the region between the moraine of '86 and the glacier there is little or no plant and animal life.

At a certain place the south end of the glacier almost reaches the Atlantic Ocean, being separated therefrom only by a land-bridge less than 10 kilometers (about 5 English miles) wide, outside of which lies a laguna with brackish water and a narrow sand-bar about 140 paces across. The bridge consists of four parallel series of terminal moraines with dells between and pools and ponds both on the top of the hills and in the bottom of the dells. The moraine close to the laguna dates from 1869, and the two following moraines are from 1877 and 1895. On the side of the 1895 moraine, facing the ocean and near its top, is an indistinct wall representing the moraine of 1886; and facing the glacier but at the foot of the 1895 moraine is a small 1901 moraine. Between the latter and the glacier is a chaotic conglomeration of ice-blocks, water, muddy clay and rocks.

At "Flaua-jökul" the landscape from the glacier toward the ocean and the river-plains is characterized exactly like that at "Fell," by parallel series of moraine-hills indicating a creation at different periods. At least three series are present, each constituting a definite type, similar to the ones found at "Fell." Unfortunately, however, at "Flaua-jökul" the exact age of the moraines could not be obtained; and therefore the length of the epochs of the different floristic and faunistic ecological associations could be estimated only by comparison with the records from "Fell." Otherwise, the natural conditions of the moraine landscape at "Flaua-jökul" offered much better opportunities for a study of the question which principally interested me, namely the sequence in which the plants and animals migrated into the land and the lakes created by the receding glaciers, and the physical conditions determining the sequence.

Farthest off from the glacier, the hills, corresponding to the moraine walls of 1869 at "Fell," are rounded, the ponds and pools oval, rather large and with flatly concave bottom, and the whole landscape is undulating. In the middle series of moraines

corresponding to those from 1877 to 1895 at "Fell," the material has not been exposed to rain and decomposition as long as in the older moraine, and the sliding down of earth and stones and leveling of the surface has been active for a shorter period. Therefore the hills are pointed or have sharp crests, and the pools on the top of the hills or in the valleys are circular and smaller. Their bottom is more funnel-shaped and they are apparently, but not really, deeper than in the outer moraine. The inner moraine is in a chaotic state. There are no definite hilltops and pools; but everywhere heaps of gravel, stones, ice and water.

As to the flora and fauna of these localities, the interesting fact was discovered that plants and animals are advancing right to the ice, though life, of course, is developed to its highest degree of variation and abundance in the outer moraine.

The order in which the migration progresses and the moraines are populated is best realized by the study of the pools and ponds.

In the outer-moraine these are inhabited by a characteristic flora of perennial flower-plants such as: *Batrachium* with white petals fully out below the water surface, *Myriophyllum*, one species of *Potamogeton* with narrow, grass-like leaves and another species with broader leaves. At least two species of *Limnaeus* snails were feeding on the plants. Phytoplankton was present in great quantity but the Zooplankton was sparse. There were plenty of threadlike Confervae from which Haliplid larvae were sucking the juice. Red Chironomid larvae, *Tanytus* and other nemocerosus larvae live in the detritus on the bottom. *Arctocorixa* and three different Dytiscids are feeding on them. In these old ponds Phryganeid larvae were present, and the stones were covered with furcate colonies of Bryozoa. To some of the ponds "Stickle-backs" (*Gasterosteus aculeatus*) had found their way from inlets with brackish water, causing a change in the described ecological association. The water boatmen and water beetles disappeared. Either they must have been eaten, probably while in the larval stage, by the fishes or the latter had gorged themselves so thoroughly on the worms and larvae in the mud and on the stones that nothing was left to the predaceous insects. Investigation of the stomach content did not give definite results. Terns (*Sterna*) were flying over the ponds in an endeavor, I suppose, to catch the fishes, many of which were infested with large tape-worms, one to each fish.

In the ponds belonging to the middle moraine no flowering plants occurred, but Confervae were present and there were many Nostoc balls. Ostracoda and Phytoplankton were plentiful. The Nemocera larvae in soft dirt-tubes, so common everywhere, were attached to the stones and another form of Nemocera in a thick gelatinous bag, was floating calmly in the

surface. The latter form was present in quite large numbers and was very characteristic for the waters in the middle moraine, but was rare or absent in all other places. There were many larvae and adults of *Agabus* and *Hydroporus* and also of the water boatman *Arctocorixa*; but the Phryganeid larvae were absent because the water contained too large an amount of unsettled clay. There were no *Gasterosteus* and no snails.

In the puddles and water holes of the inner moraine a fine, slightly greenish tinge from innumerable microscopic algae was noticeable on the muddy clay-bottom. Feeding on this fine filament were a surprising quantity of the universally present Nematocera larvae in tubes of dirt; and on these the larvae and adults of *Agabus alpestris* and *Hydroporus nigrita* were preying.

The microscopic algae, the Nematocera larvae and the two species of Dytiscids are the pioneers of organic life in the waters of the moraines. Unquestionably they came from the ponds and pools of the older moraines; but the organic life is indigenous to neither the older nor the newer moraines, for, with a single exception (the stickle-backs) the plants and animals have found their way to the moraine landscape from the marshes in the mountains or the valleys at the foot of the mountains.

The factors which determine the different character of the organic life in the ponds and pools of the moraines are the amount of clay precipitated in the water, the depth, the size and the age of the ponds, but not their location in respect to the glacier.

At "Graenafell" near station "Heineberg" a pool was found on top of a moraine-hill barely within the distance of a gun shot from the ice and yet with a flora and fauna almost identical with and as rich as that in the ponds of the oldest moraine here at "Flaua-jökul." But the water in it was very clear, and the bottom consisted of sand instead of clay. The size of the pool was 10 by 50 paces. It was one-half meter deep. The temperature of the water on the 13th of July was 17°C., and that of the air 12½° C.

The water in the puddles of the inner moraine is usually milk-white, the ball of the thermometer in some cases disappearing when 3 centimeters down. No plants other than the Confervae and the microscopic algae and no other animals than those characterized above as "the pioneers" seem to be able to live in them.

The ponds in the moraine landscape, especially those close to the glacier, are neither very large nor deep, and are therefore easily heated. In the mountains it is different. There we often find large and deep lakes bordering on the ice masses and having ice-floes drifting around in the matter. No organic life is found here.

The age of the waters in the moraines is an important factor

to consider in connection with the development of their organic life. The dilution and washing out of the clay takes a long time and so does the deposition of a layer of detritus on the bottom to make it fitted for the growth of flowering plants and the snails, bivalves, fish and birds which follow.

The general character of the land vegetation changes in the direction of the glacier, corresponding to the situation existing in the waters; but the changes are more gradual and the modifications characterized more by a continuous diminution of the number, and usually also of the vigor of the individuals in the different zones than by a reduction of the species represented.

The outer region seems to extend from that side of the oldest moraine which faces the ocean to the crest of the hills of the middle moraine. The middle region goes from here to the top of the inner moraine; and the third region occupies all the remaining space to the foot of the glacier.

In the outer region the vegetation has commenced to form a continuous sod of grass, mostly *Poa* and moss; but it covers the ground rather imperfectly and in many places the plants stand widely apart. There are also *Equisetum*, *Scirpus*, *Juncus* and many of the beautiful perennial herbs of the pastures and the fertile places in the river plains, for example, *Saxifraga*, *Thymus*, *Silene acaulis*, *Silene nutans*, *Dryas*, yellow and white *Galium*, *Cerastium*, *Arabis*, *Draba*, *Armeria*, *Sedum*, *Rumex*, *Papaver nudicaule*, etc. A few low willows are also found.

In the middle region the plants grow in small and weak tufts behind the larger stones. There is much more uncovered than covered ground. Nowhere is a continuous growth found; but the plant species are the same as in the outer region. Small round cushions of moss and lichen, one-half to one foot apart, are frequent and characteristic for this region.

The third region appears at the first glance almost dead, but weak crusts of lichen are attached in spots to the stones, and fine, green young moss plants peep up in the hollow places. On the stones around the water holes are thin grey films of dried Confervae. This growth is called "Tönder," is very inflammable and formerly was used with flint in tinder-boxes. Here and there, many fathoms apart, one can find a tuft of grass, a single *Cerastium*, a *Papaver*, a *Saxifraga*, etc.

The insect fauna is also very limited. There are *Otiorrhynchus* and *Byrrhus*, both hard-shelled beetles which are rolled around and widely scattered by the heavy wind-storms. There are Noctuids such as *Agrotis* and *Hadena*, good flyers who find honey in the flowers and carry pollen from plant to plant. Larvae were found of all these forms, proving that they belong here. *Armeria* was visited by large flies such as *Phormia coerulea*. In the flowers of *Saxifraga* two or three small species of parasitic Hymenoptera were commonly found, but no other insects; and,

reversely, parasitic Hymenoptera were not taken in any other flowers. In the low land of the middle moraine the dark sand at the bottom of flat deepenings are at times under water and at times drained and merely moist. This was the case on the day when the following observations were made.

The entire bottom surface was ornamented with an irregular arabesque-like system of slightly elevated long, tubular galleries. The width of the galleries was about equal to the size of a pin head. In the anterior part of each gallery was found a cylindrical, whitish, Tipulid larva (*Hedobia hybrida*) about 1 mm. long. Very often one-third of a broken pupal skin was sticking out of the mouth of a gallery. The imagines were present in great numbers, some flying close to the ground, others resting on it. They are long-legged and capable of running over the water film. The eggs were found on the moist surface, singly or in small masses of two or three. The larvae feed on organic particles in the sand. The imagines take no nourishment, but copulate as soon as they are developed. They were not found in any other places than the moist ground where they had lived as larvae. A small ground beetle (*Bembidium islandicum* Sharp), was running around in comparatively large numbers, both imagines and mature larvae being represented. Evidently they are preying on the larvae of the *Helobia*. On the imagines a small black spider was feeding. It did not make a regular web but spun a number of single threads, each about two feet long, attaching them to a piece of gravel and, starting from this as a common center, spread the threads close to the ground like radii, fastening the ends to small grains of sand.

The fauna of the outer region is like the flora, much richer than that of the two inner regions, particularly in the number of individuals. It takes a long time to develop a soil sufficiently fertile to produce a continuous sod with a definite ecological association of flowering plants and insects. Age, therefore, is a main factor determining the different character of the terrestrial organic life in the moraines. In fact it is almost the only one. That the proximity of the ice has no more influence on the terrestrial life than it had on the aquatic life here is very clearly brought out by the following experience.

On August the eleventh we visited a small locality on "Breidamerkur-jökul." The place was, as far as I remember, about 30 feet square and located right upon the glacier about 60 meters above the base of the inner moraine. The ice was covered by a layer of sand and gravel about $\frac{1}{4}$ meter thick, and a great number of large stones were spread all over it. The spot had been a resort for gulls. Many feathers were lying around and excrements were scattered all over the ground. There were numerous vertebrae and smaller and larger parts of fish-skeletons. Near the ground a fairly strong odor of fish was

noticed. The large stones were separated from the ice by a stratum of grass roots and plant detritus about 1 mm. thick, and below this by a layer of basaltic soil only 2 to 3 mm. thick. In this locality I found a dense and various vegetation of *Poa* grass, *Festuca rubra* with rust-fungi, *Cerastium*, *Arabis*, *Spergella*, *Saxifraga* and *Sedum*. There were no predominant species, but all specimens were strong, healthy and in full bloom, the yellow flowers of the thick blocks of *Sedum* being particularly pretty. Large flies, such as the blue *Phormia coerulea* and *Calliphora erythrocephala* were buzzing. A single specimen of a *Syrphus* was seen hovering in the air. A small Pyralid was caught flying. Several parasitic Hymenoptera were swept from the flowers, and there were plenty of adult Trichoptera. In the thin stratum of debris and grass roots under the stones several gray Podurids were taken, also two adult Carabids and two Carabid larvae, many Staphylinids representing different genera, and a small red Trombidiid. The same small black spider, which was studied in the lowlands of the moraines, was found here and its web was on the ground. When I visited the place the day was bright and it was warm in the sunshine, but after I had been lying down for a short while to collect under the stones I began to shiver. It really is astonishing how little the plants and insects were affected by having the ice underground.

It is quite evident that the entire terrestrial flora and fauna found in the river plains as well as in the moraines originate like the aquatic ones, from the marshes, meadows, ponds and grass fields of the mountain valleys. The different organisms found there have spread all over the rest of the country, flying, crawling or being passively distributed by many agencies. The wind, rivers, birds, man and domestic animals have carried seeds and other parts of plants, eggs of snails and insects and often entire animals such as small crustaceans or the hardshelled and easily rolled Curculionids and Byrrhids.

By comparison with the flora and fauna of other northern countries it is furthermore demonstrated that at least the majority of the plants and animals of the mountain valleys are identical with those occurring in the Scandinavian peninsula. This is not surprising when we remember that Iceland at the time of the Vikings was colonized by Norwegians and that the chiefs and their men and families brought with them horses, sheep, cows, chickens, dogs, hay, grain and timber. It also was customary, as told in the Sagas, to carry soil to the new land from the old homesteads.

As Iceland was completely covered with ice during the glacial period all organic life of the periods prior to the glacial must have been destroyed. It is, for instance, not thinkable that any of the present-day organisms can have developed here from terti-

ary forms like those which are found as fossils in the large clay deposits in some of the basaltic rocks.

On the contrary, some of the plants and animals originally introduced by the Vikings may have become extinct, or they may have died out in most parts of Iceland, but still be living in remote and isolated places.

This latter suggestion was advanced by Thoroddsen. In particular he called attention to the fact that the old peculiar race of small hens raised by the Vikings still is living in the isolated Öräfa district but nowhere else, and also that mice and rats are lacking here; and he believed that an entomological and botanical investigation of the district might disclose further evidence of his theory.

Off hand I did not believe that plants and insects occurring on both sides of the Öräfa district would be absent here, like the rats and mice are. I hardly could imagine that an isolation effected by comparatively narrow glacier-tongues, rivers and the ocean could prevent organisms so small and easily carried as plant seeds and insects from being introduced, when men with horses and hay every year are passing through this country on their way to Reykjavik and back. The probability of finding forms limited to Öräfa seemed also somewhat remote.

However, the question ought to be considered and the Öräfa district which is immediately to the west of Station "Fell" had to be visited before we started on our return trip to Hornefjord. To get into Öräfa, with the whole outfit of our expedition, was a difficult problem, as the unusually deep and furiously rapid river, "Jökul-á," separates the district from that part of the country where we had been studying. To cross this river was impossible. It was necessary to take the horses over the glacier above the immense gate through which the river is bursting out, roaring and foaming. The one way to accomplish it was, first to ascend to the top of the mountain plateau which is about on the level with the upper surface of the glacier, and then to proceed from here out on the ice.

THE EDGE OF BREIDAMERKUR-JÖKUL ABOVE JÖKUL-Á.

In the beginning we had trouble with the horses. They had been bought from the farms near the plains and were steady trotters, absolutely reliable in the rivers, and good mountain climbers; but not accustomed to the ice and, for this reason, nervous. The strong mountain winds ("phoens") carry much dust and the glaciers are spotted with small, dark mineral deposits of basaltic origin. In sunshine the ice, of course, melts quicker below these spots than outside of them. The horses being unfamiliar with the shiny ice always tried to step on the

dark dust, but slipped on account of the water below and missed their foothold. An accident happened which also frightened them. We were trotting along in a row with the old local guide in the lead, none of us in the saddle, and I closing the ranks. We came to a round pool, as far as I remember about 50 square feet large. It looked very shallow and I wondered why the guide was leading the expedition around it instead of going right through. My riding horse, just in front of me, evidently had been thinking like its master. Being young and lively it followed its impulse and stepped right out in the pool; but this was a very deep hole, undoubtedly melted by a hot spring in the rock below the glacier. The pony disappeared before my eyes. Shortly after I saw it lifting its head over the water. It was swimming. Then it tried to get a foothold on the ice edging the hole, and we placed horseclothes there to help it. In vain. Not carrying fire arms we were forced to leave it to drown for we had already given more time than it was safe to spend on the glacier. After having travelled quite a distance from the hole we heard the horse coming. How it had managed to save itself I can not tell.

The surface of the glacier near the edge is not at all smooth and even. It looks like an immense camp of small conical tents, all covered with black dirt. Farther in from the edge it becomes more flat and is in many places a beautiful, polished, dark blue. At the bottom the cracks and crevasses reflect colors of a pure delicacy, serene light blue or hyaline green. Everywhere water is purling. In many places it disappears in remarkable, cylindrical, oblique and very deep conduits in the ice. Most of them are six inches to one foot in diameter, and inside are clear blue. All the time a monotonous, vibrating sound was heard. Now and then a single clear note, as if produced by a gigantic tuning fork, arose from the deep of the gapes.

Twice each month the mail-carrier is scheduled to arrive. Before his arrival the "glacier-man" has to indicate the way either with arrow-marks cut deep in the sides of the ice walls or with wooden sticks in places where particularly dangerous situations are ahead. These are usually caused by the deep cracks that temporarily burst open as the result of the movements of the glacier. Sometimes one will have to follow along a crevasse to the end of it and back again on the opposite side, but often natural bridges of ice connect the edges. Some of the bridges were not much wider than a meter. To pass them was not perilous for any of us men, only very disagreeable to myself as I suffer from dizziness. But to lead or force the horses over them was a difficult affair.

On our way up through the mountains it had been raining all the time and our breeches and boots were dripping wet. On the glacier the weather was fine, but heavy clouds and the fog were

coming up. It was a great relief to us all when we realized that the trail was winding downward to the terminal moraine.

We had spent five and one-half hours on the glacier. Finally we were in Öräfa, the home of hot springs and volcanic forces, but generally more characterized by the different activities of the water in all its conversions.

ÖRÄFA AND RETURN.

In Öräfa I had the opportunity to study the remarkable organic life in a hot-water creek. It was more than 40 C. and so hot near its source that I could barely put my hand into it and grab handfuls of the gelatinous blue-green algae and green Confervae that grew therein. In this medium were living the larvae and pupae of a fly, a species of *Ephydra*. The imagines were sitting in great number on the upper surface of the algae and had laid their eggs here. Small parasitic Hymenoptera were swarming among the flies. Inside of the hyaline algae small snails were plentiful.

Near the hot-water creek was a plot of good sized birch trees, a regular little grove. Its name is "Bäjarstadr-skogen." Naturally it is the pride of the district. Thrush (*Turdus*) was found here, and the birds were making a great noise, one of them imitating the croaking of ravens. The whole flora and fauna in this wood were remarkable and rather rich. There were, however, no Cerambycids and no bark beetles; but a small, globular, hard, black mite made galleries which looked like short bark beetle galleries.

As explained above, the main object for visiting Öräfa was partly to search for plants and insects special to the mountain valleys, river plains and moraines of this district, and not found in the corresponding localities east of Jökul-á, and partly to find out if any of the forms occurring in this latter part of the country were lacking in Öräfa.

The results were in both respects negative as far as one is able to judge from provisional studies in the field.

The short Icelandic summer was almost at an end. Crowberries, blueberries and blackberries were ripe. The weather was becoming more and more unsettled and windy. The short, melancholic fall and the long winter-time were at the door. We were in a responding mood. We had had an overdose of isolation, and it was "with dry eyes we wept" over the prospect of a speedy return to civilization.

A DIASPINE WITH LEGS (HOMOPTERA: COCCIDAE).BY GLADYS HOKE, *Converse College, Spartanburg, S. C.*

The specimens from which this species has been described are, so far as is known, the first adult female diaspsines on which legs have been recognized. They were received by Mr. J. Forrest Crawford at the University of Chicago, from the Botanist at the American University of Beirut, Syria, and were sent to the Bureau of Entomology, U. S. D. A., for identification. Mr. Harold Morrison of the Bureau very kindly extended to me the privilege of describing the species.

***Leucaspis knemion*, new species.**

Female puparium.—Color white, of normal form, consisting of the brownish larval and nymphal pellicles covered with a white waxy coat a trifle larger than the nymphal pellicle which shows slightly through the wax; entire scale 2 to 4 mm. long (figs. 2, 3).

Immature female.—Larval pellicle light to dark brown in color, with well developed legs and antennae. Nymph with three pairs of rudimentary legs, marginal fringe and ceratubae extending cephalad to a point beyond the meso-legs. Nymphal pellicle (figs. 1, 5) heavily chitinized, dark brown in color; body finely perforated in mosaic-like pattern with the exception of a small area on anterior margin; segmentation of abdomen distinctly indicated on dorsum, less distinctly on venter; rostrum nearer to anus than anus is to posterior margin of pygidium; legs in normal position on venter; lobes, marginal fringe and ceratubae as in figures, occasionally with slight variations.

Male puparium.—Color white, 1.5 to 2 mm. long, larval pellicle light brown.

Adult female.—Body enclosed within nymphal pellicle; twice as long as broad, cephalic end as broad or broader than caudal end, broadest across thorax; rudimentary antenna consisting of prominent tubercle bearing 5 conspicuous setae, a seta on the derm in close proximity to tubercle; tentorium well developed, of medium size; ventral surface with two groups of about 50–60 ceratubae caudad and laterad of the tentorium, thorax bearing 3 pairs of conspicuous rudimentary legs, prolegs between anterior spiracles and tentorium, mesolegs about midway between anterior and posterior spiracles, metalegs caudad of posterior spiracles, and nearer to them than are the mesolegs; a group of 4–15 cereres cephalad of anterior spiracles. No cereres associated with posterior spiracles; ventral derm finely marked with irregular bands of tiny scallop-like protrusions on meson between tentorium and pygidium; each of the two abdominal segments anterior to the pygidium bearing near each lateral margin a group of accessory genacereres numbering 4–9, rarely with one of the anterior groups missing or with a few ceratubae associated with the cereres (fig. 4).

Pygidium.—Lobes in 2 pairs, heavily chitinized, bluntly pointed and tapering to distal end, one to two pairs of less heavily chitinized lobe-like processes on each laterus; plates slightly longer than median pair of lobes and slender, entirely fringing margin of pygidium and numbering about 70–100, frequently with one or two distinct pectinations, 2 pairs of plates between median pair of lobes and two or three between median pair and second pair of lobes; a long seta associated with each median lobe on dorsal surface, 5 pairs of well developed

marginal setae on ventral surface; genacerores in crescentic formation, numbering 14-20 (19-34), 12-18, with 3-3 or rarely 2-0 a short distance caudolaterad of last group, mesal group sometimes fused with one of the groups on either side, a group of 4-8 accessory genacerores on each side cephalolaterad of the anterior group; ceratubae arranged in a band conforming to margin and numbering about 100; dorsal surface with irregular oblong patches of denser chitin, usually 10 in number, which may or may not be associated with ceratubae; anal aperture surrounded by an area more highly chitinized than the adjacent derm; vulva nearer to caudal margin than is anus (fig. 7).

Host.—*Pinus pinea*.

Locality.—Beirut, Syria: April 18, 1923.

Types.—In the U. S. National Collection of Coccidae. Two slide mounts from the type material were sent to Mr. E. E. Green, for an opinion regarding the correctness of the interpretation of the ventral thoracic spine-like structures as legs. Slide mounts of two larval pellicles, one nymph, five nymphal pellicles, and five adult females were examined.

This species can be distinguished from *L. pini* Hartig, apparently its nearest relative, by the presence of 3 pairs of rudimentary legs in the nymph, nymphal pellicle and adult female, by the presence of 3 pairs of groups of accessory genacerores, by the greater number of plates on the pygidium, by the absence of cerores associated with the posterior spiracles, and by the greater proximity of the rostrum of the nymphal pellicle to the posterior margin of the pygidium. In the nymphal pellicle the distance between the anus and the rostrum is less than the distance between the anus and the posterior margin of the pygidium, while in *pini* the distance of the rostrum from the anus is from 2 to 2½ times as great as the distance from the anus to the posterior margin. There is also a difference in the number and arrangement of the ceratubae on the pygidium and a difference in the pygidial and lateral fringe.

Some of the distinctive characteristics of *knemion* and the following species of *Leucaspis* which occur on *Pinus* are indicated in the chart. Types were not available for study in making these comparisons and all of the data concerning the species that are marked with a star were taken from published descriptions and figures of these species.

EXPLANATION OF PLATE I.

Leucaspis knemion, new species.

Fig. 1. Pellicle of nymph, × 21.

Fig. 2. Dorsal aspect of puparium.

Fig. 3. Ventral aspect of puparium

Fig. 4. Adult female, × 48.

Fig. 5. Pygidium of nymphal pellicle, × 96.

Fig. 6. Mesothoracic leg of adult female, × 424.

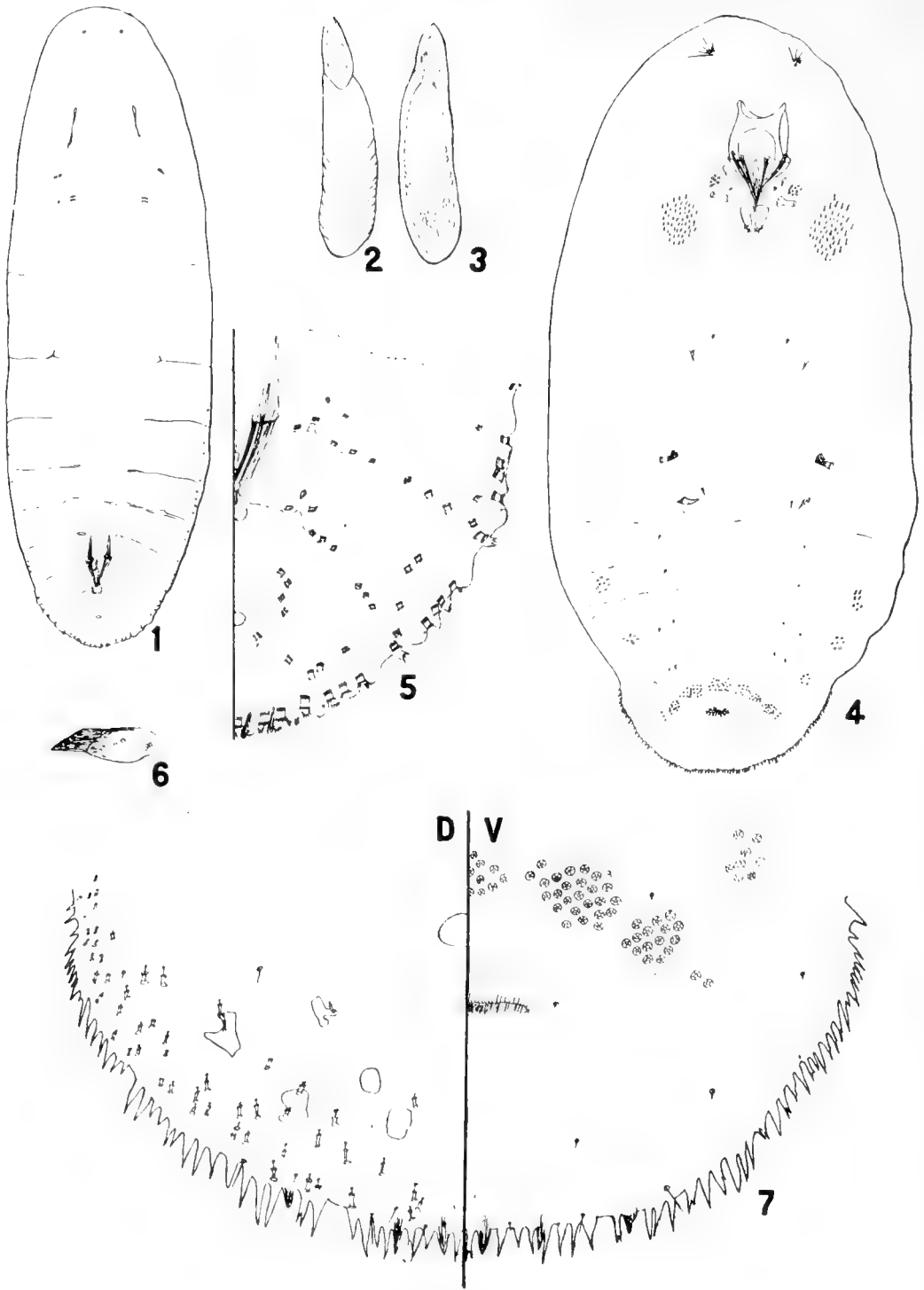
Fig. 7. Pygidium of adult female, × 184: D. Dorsal aspect. V. Ventral aspect.

COMPARATIVE CHART SHOWING CHARACTERS

SPECIES	GENA- CERORES	ACCESSORY GENACERORES	LOBES
<i>knemion</i>	14-20 19-34 (12-18) + (3-0)	3 paired groups: 4-8 on pygidium, 4-9 on each of the 2 segments immediately anterior to pygidium	2 pairs and 1-2 pairs of lobelets
<i>pini</i> Hartig	11-13 15-17 10-12	2 paired groups of 2-4 on the 2 segments immediately anterior to pygidium	3 pairs and 1 pair of lobelets
<i>pusilla</i> Loew	9 10-11 10-6	0	1 pair and 1 pair of lobelets
<i>perezi</i> Green*	single arch of 30-45	0	3 pairs narrow
<i>signoreti</i> Targ.*	18 21-22 24-25 — 11 20-17 10-9	9 — 6 on the 2 segments immediately anterior to pygidium, 5 — 3 on third segment anterior to pygidium	3 pairs short
<i>india-orientalis</i> Lindg.*	0		0
<i>loewi</i> Colvée	16 14-10 13-15	0	3 pairs and 2 pairs of lobe-like protrusions

OF LEUCASPIS SPECIES ON PINUS.

PLATES	ANTERIOR SPIRACERORES	POSTERIOR SPIRACERORES	LEGS	ROSTRUM OF NYMPHAL PELLICLE
70-100 slightly longer than lobes	4-15	0	3 pairs rudimentary	slightly nearer to anus than anus is to posterior margin
about 42 much longer than lobes	9-11	2-3	0	twice as far from anus as anus is from posterior margin
occasionally fused, at least twice as long as lobes	5-6	0	0	twice as far from anus as anus is from posterior margin
26-32 twice as long as lobes	5-6			just below center of body
62 much longer than lobes				
	0	0	0	
			0	



HOKE—A DIASPINE WITH LEGS.

Actual date of publication, March 14, 1925.

EDITORIAL.

At this time when nearly everybody is minding everybody else's business, one hesitates to propose a new regulation. It is apt to be too joyfully accepted, and some one is all too apt to expand the proposition. Nevertheless we do feel that the rules governing species making should be emended, enlarged and stiffened. New names are becoming almost as common as automobiles. The highway of Science is congested with them, and they go pretty much as they please. The entomological pedestrian, unprotected by adequate "traffic regulations," is at the mercy of any joy rider who has ink and impudence enough to take the road and feels like stepping on the gas. Under the present codes any ignoramus can write a few words about an insect, propose a new name—almost any kind of a new name—for it, print his verbiage in any old way so long as he offers the product "for sale"; and Entomology must take the burden of his "new species," the honest systematist worry with his unusable name. Such work is positively harmful. It should be outlawed, and the resultant name promptly nullified. Can they be? Not under present conditions. The "author" is within the law. Well, let us emend the law.

To this end we offer (humbly and not without some misgivings) the following suggestions to our zoological legislators:

1. That certain collections and kinds of collections be specifically designated as "type depositories"; and that no name be counted validated until the type has been deposited in one of said depositories.

2. That no description be recognized unless certain facts regarding the insect are definitely stated (the number and nature of these facts to be determined in each Order, Class, etc., by a commission of competent systematists interested in said Order, Class, etc.)

3. That legitimate organs of publication and what constitutes publication be more exactly defined; and that no private publication be accepted unless it receive the imprimatur of the Zoological Commission.

These are suggestions, submitted for what they are worth in the hope that they may provoke discussion and serious consideration of the problem. We realize the danger, the possible abuse of authority, that lurks in any measure of regulation. We are jealous of the freedom of Science. But freedom, we know, can only exist undirected where men are few and their selfishnesses do not conflict. For those who live apart and respect the rights of others, anarchy is the ideal state. For those who don't, the best rule is a club, preferably a spiked one. The entomological highway is becoming crowded and, unless we are to have "confusion worse confounded," we shall have to lay down stricter rules of the road.

—*Carl Heinrich.*

NOTES AND NEWS ITEMS.

Anatomy and Physiology of the Honeybee, R. E. Snodgrass, 1925, McGraw-Hill Book Company, Inc., pp. i-xv, 1-327, figs. 1-108, \$3.50.—Some time ago when we learned that Mr. Snodgrass was preparing a new book on the anatomy of the honeybee we heralded the announcement with pleasure. The work published by the same author in 1910 had proven so valuable for reference that we felt assured that the new book would be equally useful. Nevertheless the appearance of this new publication gave us many pleasant surprises for here we have not only the old work brought up to date but in addition an extensive discussion of the physiology as well. To call this book the anatomy and physiology of the honeybee speaks only part of the truth. It is much more. To satisfactorily present the honeybee to the public the author has advisedly gone back of the honeybee to simpler forms to give a proper background for the understanding of the bee itself. In doing this he has made more really a text on insect anatomy and physiology with the honeybee as a type. For this reason if no other this book promises to be of great value to the entomologist.

During recent years much work has been done on the anatomy and physiology of insects which has not been fully utilized by authors of texts dealing with insects. Most of this work has been scattered through many publications and some of it was so technical that considerable study was required before it could be applied to any particular problem. When these papers had either directly or indirectly any bearing on the honeybee Snodgrass has carefully summarized them and made available to the student much very valuable information. Thus the chapter on "The Muscles," the chapter on "The Fat Body" and the chapters dealing with development and metamorphosis present in a clear, concise manner phases of a subject not always satisfactorily treated by other authors of general texts. Altogether the book should prove to be a wonderful source of information to students of all insects and those who examine the title and pass it by will miss an opportunity to secure valuable aid on many of their problems. The style of the author is so simple and direct that reading the book is a pleasure. The printing and make up are all that can be wished and the author and publishers are to be congratulated for the almost complete freedom from typographical errors.

—S. A. Rohwer.

PROCEEDINGS
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The regular meetings of the Society are held on the first Thursday of each month, from October to June, inclusive, at 8 p. m.

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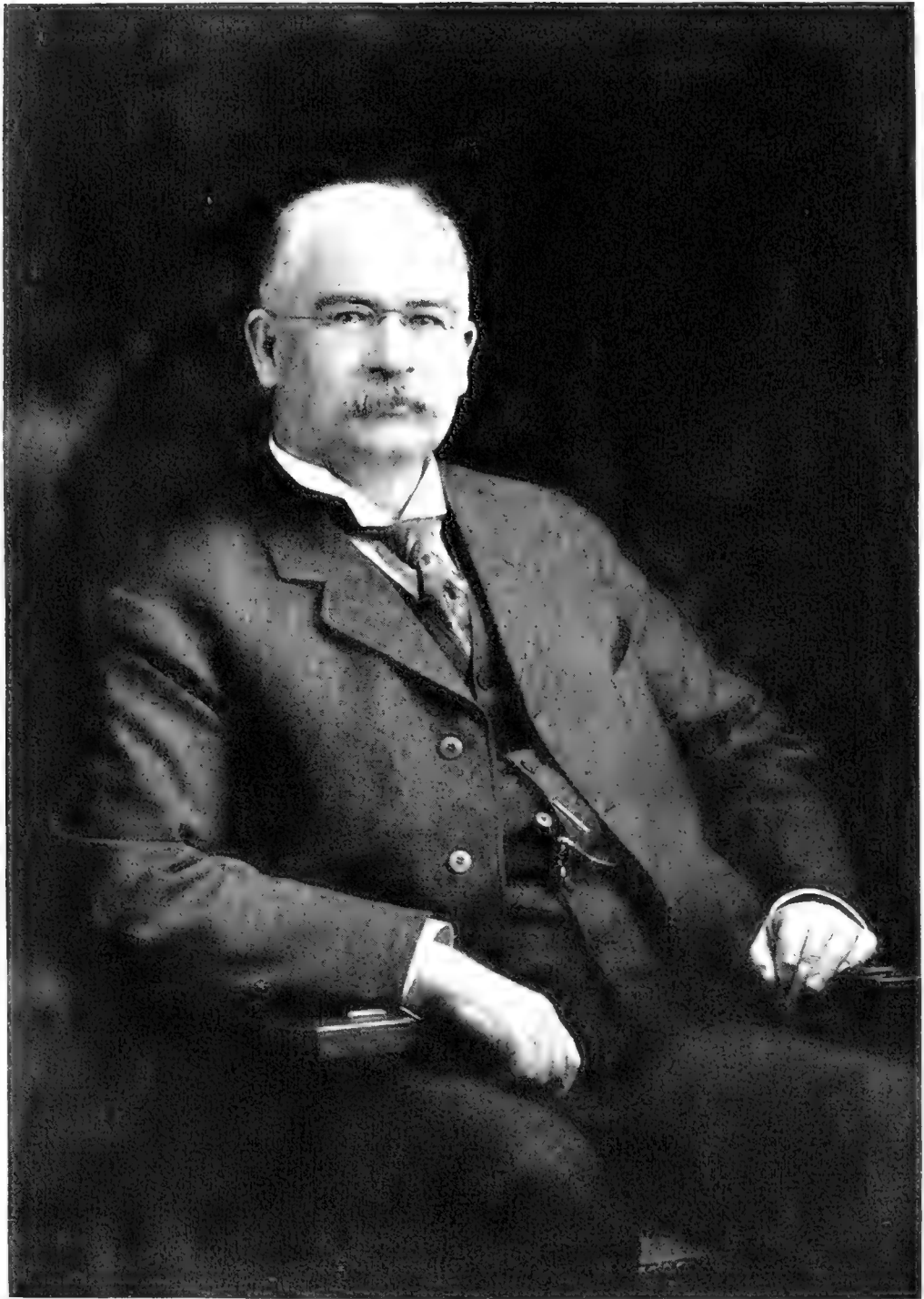
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COLONEL THOMAS LINCOLN CASEY.


PROCEEDINGS OF THE
ENTOMOLOGICAL SOCIETY OF WASHINGTON

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In Memoriam


The following resolution was adopted by The Entomological Society of Washington February 5, 1925.

With the death of Col. Thos. L. Casey the Entomological Society of Washington has lost one of its oldest and best known members, a genial companion, a profound student and the author of an extensive and important series of works on the beetles of America, printed chiefly at his own expense and distributed with rare generosity to other students.

The Society feels its loss and wishes by this resolution to express its sincere sympathy for the bereaved family.



COLONEL THOMAS LINCOLN CASEY.

BY E. A. SCHWARZ AND W. M. MANN.

Thomas Lincoln Casey was born at West Point, New York, February 19, 1857.

His early education was obtained in private schools, after which he studied at the Sheffield Scientific School of Yale in 1874-75 and then entered West Point, from which he graduated in 1879. He received his commission in the Engineer Corps of the Army and remained there, passing through various grades to Colonel, until 1912, when he retired.

In 1882, as a young Lieutenant, he was a member of the Astronomical Expedition to study the transit of Venus, and visited the Cape of Good Hope. At different times field work in engineering, studies of river and harbor improvements and duties connected with the Light House Board, of which he was Chairman, took him to various parts of the States.

To Colonel Casey, the classification and description of adult beetles was a diversion, but not his only hobby, for Conchology took up a considerable part of his time and he made notable collections of fossil shells of the Lower Mississippi and published on the family Pleurotomidae. From his pen came also papers on Astronomy as well as on military engineering and other subjects connected with his official work.

His engineering instincts and training are shown in the exactness of his systematic writings and in the exquisitely prepared specimens of his collection, as well as in his method of work. For years before his retirement but two hours each afternoon could be devoted to systematic work on insects. This time he spent with mathematical regularity in the "beetle room" at his apartment, with specimens, note pad and binocular microscope in front of him; and it is from these leisure hours that we have the greater part of his studies on the Coleoptera.

The first entomological work of Colonel Casey was published in 1884 when a few short notes on beetles were printed in the *Bulletin of the Brooklyn Entomological Society*, followed the same year by five other papers, one of them a monograph on the American Cucujidae and another an extensive study of the subfamily Stenini. From then on he was one of the most prolific writers on Coleoptera. Up to 1910 he had published about 50 papers, some of them monographic in scope, and treating complicated and often neglected families.

In 1910 appeared the first volume of his notable series "Memoirs on the Coleoptera," which was completed with Volume II in 1924. In these volumes he departed from his earlier field and included descriptions of Central and South American species.

These papers were published and distributed privately. The Colonel had usually defrayed the cost of publication of his papers when published in other journals. In the distribution of the separates, he showed an intelligent generosity. In addition to his mailing list he dispatched bundles of separates to different entomological centers with instructions that copies be given to deserving students.

Colonel Casey died February 3, 1925. With him passed one of the most prominent of a generation of amateurs, a small group of earnest Coleopterists to whose industry we owe much of the present accepted classification of American beetles.

He was buried at the National Cemetery at Arlington, Va., with military honors. At the wish of his wife, Laura Welsh Casey, the microscope that had become so much a part of the Colonel's life was placed in his casket.

With the advancement of science always in mind, he bequeathed his entire estate to scientific societies and his collections and exceptionally complete library to the United States National Museum.

Colonel Casey was a charter member of the Entomological Society of Washington, and the records show that he was one of six members present at the second meeting, which took place on October 2, 1884, when he presented one of the three papers of the evening.

A NEW SPECIES OF MYRMECOPHILOUS THYSANURA FROM BOLIVIA.

BY A. N. CAUDELL, *U. S. Bureau of Entomology.*

Atelura manni, new species.

The insect described and figured below apparently belongs to the lepismid genus *Atelura* of Hayden and, like many of its allies, is interesting by having the scales of the body replaced for the most part by hairs or bristles. Escherich, *Zoologica*, Heft 43, 1905, has monographed the Lepismidae and given a key to the species of *Atelura*. So far as listed by the Zoological Record, which has been consulted as far as yet issued, the last volume seen being that for the year 1922, no species of this genus has been described which is at all liable to confusion with the one here characterized. Since the monograph of Escherich nine species of *Atelura* have been described from the Old World, while only five New World forms have been described. The New World species include four termitophilous species from British Guiana described by Folsom and a Mexican form described by Silvestri under the synonymic genus *Grassiella*. As the present species from Bolivia apparently differs materially in various respects from all described forms it is here described as new under the specific name *manni*, being dedicated to its collector, Dr. Wm. Mann.

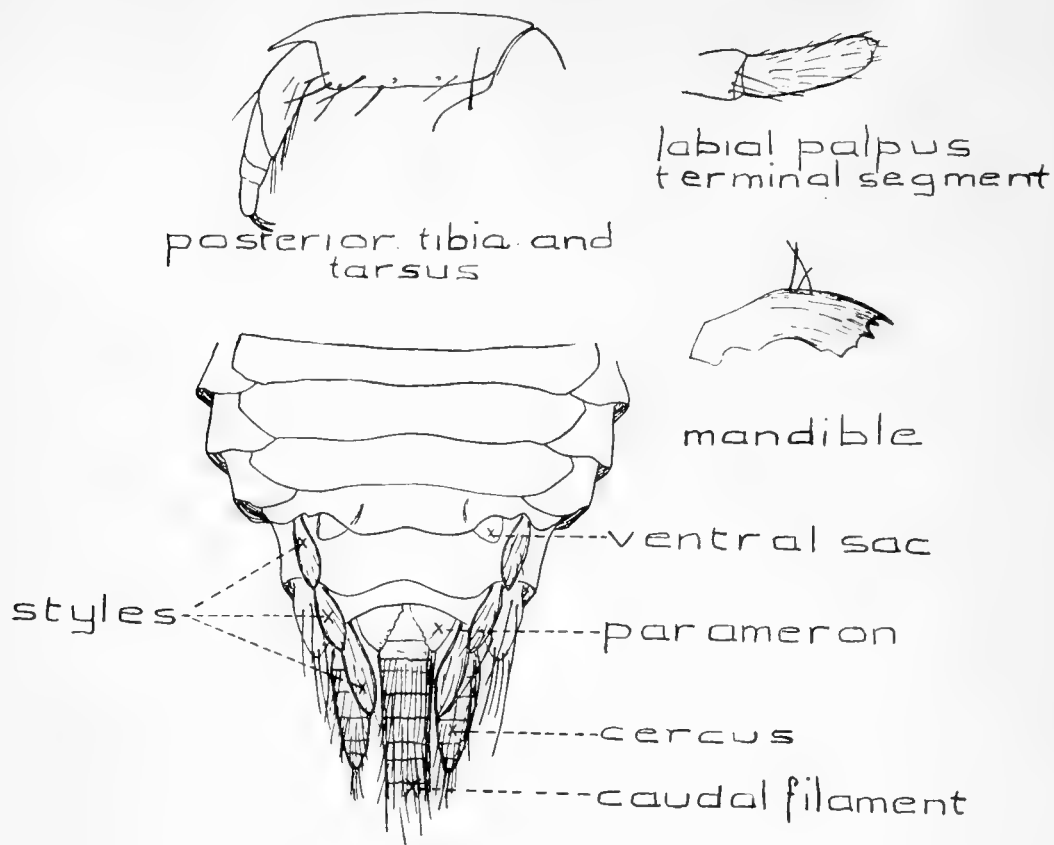


Fig. 1. Details of *Atelura manni*.

Description.—(Male, female unknown). Moderately large for the genus and the general color reddish-brown, lighter beneath and with the tip of abdomen with its appendages yellowish. Head crushed in capture but showing the following features: Antenna incomplete, the remaining segments beyond the simple first and second closely connate and each with a couple of rings, making the whole appear as if formed of numerous very short segments; eyes absent; mandibles but moderately chitinized, and furnished with three sharp teeth on one-half of the apical margin, the other half irregular, as shown in the accompanying figure; both pairs of palpi with the terminal segments four or five times as long as thick, being more elongate than ordinarily the case in these insects.

Thorax broad, dorsally strongly convex, slightly longer than the abdomen, posteriorly broadening and with the surface almost bare as seen under even the highest power of the binocular (85 \times), a few hairs only seen along the margins; the pronotum is about a third longer than either of the other thoracic segments, which are subequal in length. Abdomen short and broad, anteriorly as broad as the posterior width of the metanotum but rapidly tapering posteriorly; its dorsal surface strongly convex and bearing a few fine hairs and with numerous long stiff hairs or bristles, which are directed posteriorly, along the lateral margins; without scales so far as discernible with the binocular; there are nine dorsal and eight ventral segments visible; the cerci and caudal filament are imperfect, having the tips broken off, the remaining portions covered with stiff, posteriorly directed hairs; cerci apparently about as long as

the mesonotum and distinctly segmented; the parameres very light in color, and triangular in shape, the bases slightly separated, the outer margins curved and the inner margins oblique, as shown in the figure; the seventh, eighth and ninth ventral segments each bearing a pair of lateral styles which are hairy and directed posteriorly, those of the ninth slightly longer than the others, being a little more than one-half as long as the cerci; near the inner margin of the base of each style on the seventh segment is a short ventral sac, whitish in color and about as long as broad, the length no more than the width of the adjacent style.

Legs with broad coxae as characteristic of these insects.

Measurements.—Length, total to tip of abdomen, about 4.5 mm.; thorax, 2 mm.; pronotum, 1 mm.; abdomen, exclusive of appendages, 1.5 mm.; width, across metanotum, 2.5 mm.

Type-locality.—Cachuela Esperanza, Beni, Bolivia.

Described from a single dried specimen, the male type, collected in March, 1922, near the center of a marching colony of the army ant, *Eciton vagans* Ol. by W. M. Mann, entomologist with the Mulford Expedition to South America.

Type.—Cat. No. 27885, U. S. N. M.

Eliminating from section 6 in Escherich's key the character of being termitophilous this species runs to category 10. It differs very decidedly, however, from both species (*termitobia* and *synoiketa*) which run out at category 10, by being much larger than either of them as well as by being myrmecophilous instead of termitophilous. The partial absence of antennae makes it impossible to decide under which alternate of category 10 it would go. From the species described by Folsom from British Guiana this form seems unquestionably distinct, being decidedly larger in size, found associated with ants instead of termites and by various morphological characters.

The nakedness of this species may be due to excessive rubbing during capture, but careful examination fails to show traces of scales. This absence of scales, if real rather than apparent, would prohibit this species being referred to *Atelura* as treated by Escherich, who described that genus as composed of species with the body covered by scales. *A. manni* can not be relegated to any other described genus known to the author and if it does not belong to *Atelura* it must represent a new genus. It is thought best to refer it to *Atelura*, at least for the present, especially as some of the species of that genus appear to have the scale covering of the body very inconspicuous.

A NEW NORTH AMERICAN GENUS OF MICROLEPIDOPTERA
(GLYPHIPTERYGIDAE).

By AUGUST BUSCK, *U. S. Bureau of Entomology.*

Ellabella, new genus.

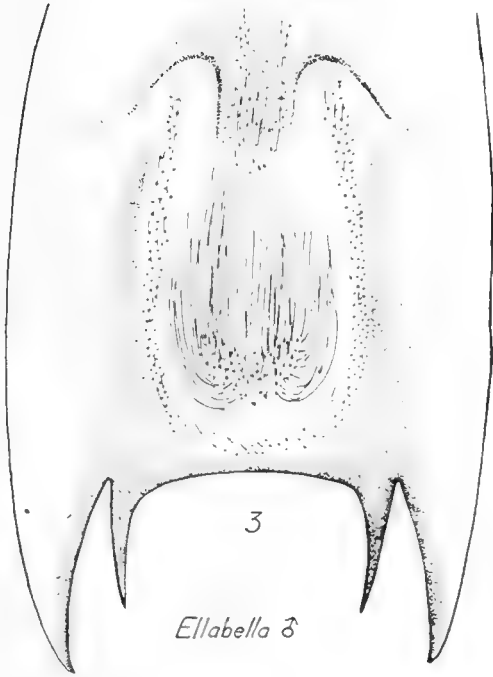
(Plate 3.)

Antennae simple, 2/3, very shortly ciliate in the male. Tongue well developed, spiraled, scaled at base. Labial palpi long, straight, nearly smooth, porrected; second joint long, slightly thickened with scales, loosely applied above; terminal joint short, blunt. Face smooth; head with loosely applied scaling; thorax with posterior scaletuft. Forewings elongate ovate; apex pointed; with raised scaletufts; 12 veins; all separate; 1b furcate at base; 1c present, strong throughout; 2 from outer fourth of cell; 3, 4 and 5 equidistant, from end of cell; 7 to termen. Hindwings slightly broader than forewings; without pecten at the base of the cell; costa straight; termen and dorsum evenly rounded; 8 veins; 3 and 4 connate; 5 nearest 6; 6 and 7 parallel; 8 free. Posterior tibiae smooth. Male genitalia (Fig. 1) with well developed uncus, bluntly pointed; gnathos strongly armored with numerous stout spines; transtilla narrow bandlike (in the figure the central part of the transtilla is obscured by the spined part of the gnathos); socii absent; harpes simple with a costal and a dorsal fold; vinculum narrow; anellus with two lateral strongly chitinized processes and two hairy palpifers; oedeagus long, stout, pointed; penis without cornuti. Female genitalia (Fig. 2) with the lobes of the ovipositor small, narrow and curved so as together to form a tube, open in front; genital plate large, triangular, well chitinized and placed in the intersegmental skin well behind and quite separate from the genital opening (a very unusual character); genital opening large and funnelshaped; ductus bursae rather short and wide, slightly chitinized below the genital opening; bursa copulatrix with large spined signum, the edges of which are not strongly defined against the surrounding granulated part of the bursa.

Type.—*Ellabella editha* Busck.

The genus is nearest to and probably correlated with *Lotisma* Busck, which has nearly the same venation as this genus, differing mainly in having veins 3 and 4 of hindwing stalked, instead of connate; the genitalia, however, present several important differences, which definitely separate the two genera. In *Lotisma* the gnathos is absent, the transtilla is divided and reduced to spined processes from the harps; the harps are highly developed with strongly chitinized claw-like process on the dorsal fold. All of these characters show a considerable advance over *Ellabella* and together with the more advanced venational character indicate possibly a derivation from, rather than a correlation with that genus.

The genus *Araeolepia* Walsingham, which also belongs in this immediate group, but which has veins 3 and 4 of the hindwing widely separate, approaches *Lotisma* in the divided transtilla and the armed harps, but has retained the gnathos as has



Ellabella ♂



Ellabella ♀

BUSCK—NEW NORTH AMERICAN GENUS.

Ellabella and is at once differentiated from both by the very different hoodlike, broad uncus and the pointed vinculum.

***Ellabella editha*, new species.**

Labial palpi and face mouse-gray, speckled with white. Vertex ochreous white. Thorax ochreous brown with a broad transverse fascia of white; posterior tuft dark brown. Forewings whitish overlaid with ochreous, brown and black scales and with three illdefined transverse lines of black, forming strong tufts of raised black scales on the cell; the outer one is surrounded by a dark circular line and gives the impression of an indistinct eyespot, especially in slightly rubbed specimens; outer third of the wing slightly overlaid with light brown and irregularly dusted with black scales; a series of blackish spots, intervened by gray, along costal edge from basal fourth to apex and a much less pronounced series of dark spots along the terminal edge; cilia mouse-gray. Hindwing light brownish fuscous with lighter cilia. Abdomen ochreous fuscous. Legs and underside ochreous.

Alar expanse.—19–22 mm. The females average larger than males.

Habitat.—Quamican Lake, Vancouver Isl., Saanickten, British Columbia. E. H. Blackmore, Coll. Waterton Lakes, Alberta, Canada. McDunnough, Coll.

Type.—Cat. No. 28055 U. S. N. M.

Paratypes.—U. S. N. Mus.; Coll. Blackmore; Can. Nat. Coll.

The drawings were made from slides, prepared by the writer, and under his supervision, by Mr. Harry Bradford of the U. S. Bureau of Entomology.

EXPLANATION OF PLATE 3.

Fig. 1. Male genitalia of *Ellabella editha* Busck.

Fig. 2. Scaletufts in pockets on underside of abdomen in intersegmental skin between seventh and eighth segment.

Fig. 3. Scaletufts in depression on underside of abdomen on first to third segment.

Fig. 4. Female genitalia of *Ellabella editha* Busck.

ON THE GENUS *SETIOSTOMA* ZELLER (LEPIDOPTERA: STENOMIDAE).

By AUGUST BUSCK, U. S. Bureau of Entomology.

(Plate 4.)

In a paper dealing with other forms (Can. Ent., vol. 53, p. 279, 1921) the writer incidentally pointed out that a study of the genitalia proves the genus *Setiostoma* Zeller to belong in the family *Stenomidae* and not in the *Glyphipterygidae* as had hitherto been supposed.

At the time, no drawing of the genitalia was available, but I am now able to present the evidence by figures of the type of the genus, *Setiostoma xanthobasis* Zeller (Fig. 1), which clearly demonstrates the family relations of the genus. For comparison the genitalia of a typical Stenomid, *Stenoma querciella* Busck is given (Fig. 2).

I am indebted to Mr. Harry Bradford of the Bureau of Entomology for the excellent drawings, made from my slides.

The genus *Setiostoma* has the following characters:

Antennae $\frac{3}{4}$, in the female shortly pubescent, in the male with very long, 5-6, soft ciliation on the underside, a striking character, not mentioned, strangely enough, by either Zeller or Riley; no pecten on basal joint. Labial palpi upturned, reaching above vertex, slightly thickened with rough scaling, terminal joint nearly as long as second, somewhat flattened, pointed. Face, head and thorax smooth-scaled. Forewings with costa and dorsum parallel, apex bluntly pointed, termen straight, oblique; 12 veins, all separate, 2 from middle of cell, 3 from outer fourth of cell, 4 from end of cell, 7 to costa or apex, 1b furcate at base, 1c traceable in the entire length, but tubular only on outer fifth. Hindwings broader than forewings, costa straight, apex blunt, termen and dorsum evenly rounded, semicircular; 8 veins; 3 and 4 stalked, 6 and 7 stalked, 5 nearest 4. Posterior tibiae smooth, except for small tufts between the spurs. Male genitalia with uncus pointed; gnathos a simple band; socii absent; transtilla absent; harpes simple with sixlobed, palmate hairs on outer part of costa; vinculum narrow, incomplete in front, anellus with two upright flattened processes; oedeagus very large with pointed apex; cornuti a large cluster of small spines apparently cemented together to form one whole and one (or more) large single spines (the genotype has one such single spine, while *Setiostoma fernaldella* Riley has six).

Setiostoma is a tropical American genus with a single species, the genotype, occurring in temperate North America. The larvae of *S. xanthobasis*, Zeller, feeds between leaves of oak, spun together with silk. In the latitude of Washington the larvae are found in May and in July, the pupation takes place between the leaves in a small silken cocoon and the moths appear in June and in August; there is presumably a third generation with overwintering larvae or pupae. The larva is a very brilliantly colored caterpillar with pale green groundcolor; head, thoracic shield and anal plate yellowish brown; second and third thoracic segments vivid crimson; first abdominal segment whitish, unmarked; the rest of the abdominal segments marked with series of wine-red blotches around the setal tubercles, which are large and deep red, except the dorsal series around setae 1 and 2, which are shiny yellowish brown. Setal arrangement gelechioid. Prolegs with uniordinal hooks in a single circlet, broken inwardly.

The tropical species of the genus, as far as known, feed on *Ficus*.

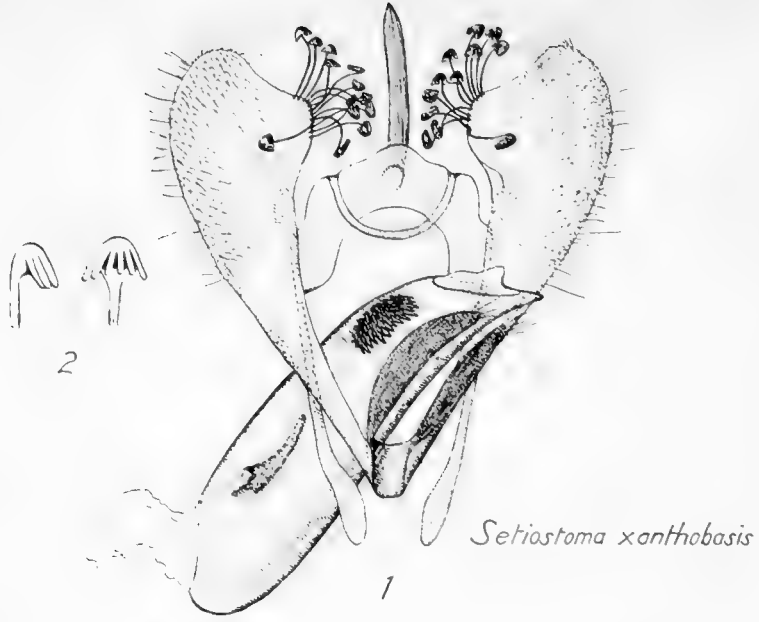
EXPLANATION OF PLATE 4.

Fig. 1. Male genitalia of *Setiostoma xanthobasis* Zeller.

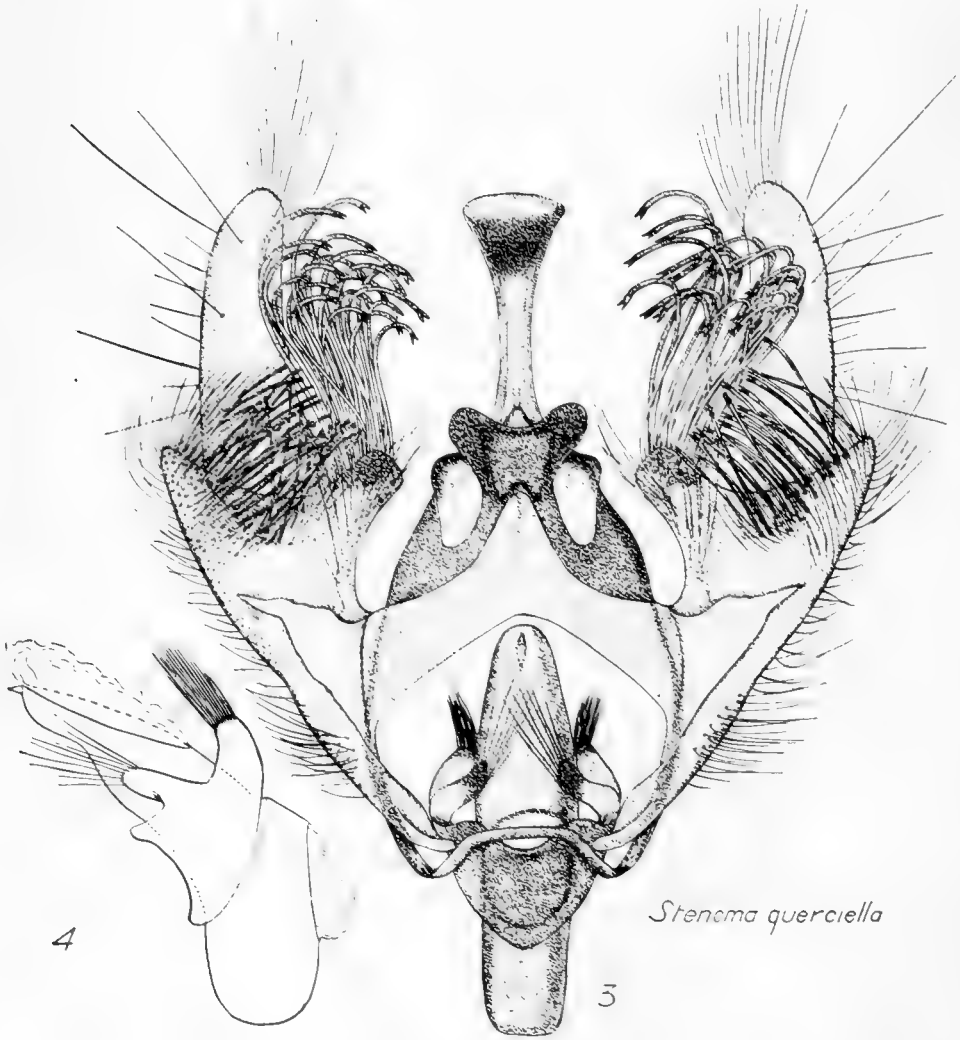
Fig. 2. Palmate hairs on harpes (greatly enlarged).

Fig. 3. Male genitalia of *Stenoma querciella* Busck.

Fig. 4. Oedeagus and anellus (side view).



Setiostoma xanthobasis



Stenoma querciella

REVISION OF THE GENUS *NEOASCIA* WILLISTON (DIPTERA: SYRPHIDAE).¹

By C. HOWARD CURRAN, *Ottawa, Ontario.*

Meigen established the genus *Ascia* in 1822, and this name had been used without question by succeeding authors until 1886, when Williston changed the name to *Neoascia* because of the previous use of the name *Ascia* by Scopoli for a group of Lepidoptera. Apparently Scopoli's use of the name has never been accepted and consequently the use of *Ascia* for this group of Syrphidae has prevailed elsewhere than in North America until quite recently.

The genus comprises the smallest species of Syrphidae and is characterized by a constricted abdomen, arista shorter than the antennae, eyes separated in both sexes; apical crossvein more or less rectangular and joining the third vein well before the wing tip.

All the known species are closely allied; in almost all the epistoma is produced, the lower sides of the front is pale haired in the ♂; the hind femora are incrassate, black, almost always yellow at the base, with rather conspicuous spinules below, the hind tibiae somewhat arcuate.

The term, "occipital cilia," is used to denote the longer hairs on the occiput above. The apical crossvein is the vein closing the first posterior cell, which I have termed the "apical cell."

TABLE OF SPECIES.

Males.

1. Front four legs wholly pale yellow.....	<i>albipes</i> Bigot.
At least the front femora or tibiae with a strong black or brown band...2.	
2. Fifth sternite not over half as long as wide; third tergite with a rather narrow, interrupted or entire yellowish basal fascia; genitalia large, somewhat globose.....	<i>sphaerophoria</i> n. sp.
Fifth sternite at least three-fourths as long as wide, genitalia of normal size.....	3
3. Abdomen with two yellow fasciae or four spots.....	4.
Abdomen either immaculate or with only one band or two spots.....	5.
4. Front femora with the basal fourth or more yellowish; second abdominal fascia usually interrupted.....	<i>globosa</i> Walker.
Front femora black quite to their base or only very narrowly yellow; second abdominal fascia never interrupted.....	<i>metallica</i> Williston.
5. Abdomen immaculate.....	6.
Abdomen with yellow markings.....	7.
6. Small species, the pile of the mesonotum yellow or even whitish, color blue-black or steel blue.....	10.

¹Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa, Canada.

- Larger, 5 mm. or more, the pile of the mesonotum tawny; the distance between the anterior ocellus and base of the antennae is much greater than the width of the front.....*distincta* Williston.
7. Front four tibiae wholly yellow or with a faint reddish band, third antennal joint twice as long as wide, facial pubescence silvery.....
distincta Williston.
- Front four tibiae with blackish bands on apical half. Third antennal joint not over one and one-half times as long as broad; facial pubescence with yellowish tinge.....8.
8. Posterior femora unusually swollen, one-third as wide as long.....
macrofemoralis, n. sp.
- Posterior femora normal in size, not one-fourth as wide as long.....9.
9. Third antennal joint scarcely longer than broad, its apex subtruncate; second and third joints of hind tarsi whitish yellow.....*unifasciata*, n. sp.
- Third antennal joint almost one and one-half times as long as wide, its apex almost evenly rounded, hind tarsi wholly blackish.....*conica* n. sp.
10. Occiput black pilose above; front bluish-black with steel blue reflections, the distance between the anterior ocellus and base of the antennae is less than the width of the front.....*subchalybea*, n. sp.
- Occiput pale pilose above the cilia sometimes black; front greenish black; the distance between the anterior ocellus and base of the antennae is much greater than the width of the front.....*minuta*, n. sp.
- Females.
1. Anterior four legs all yellow.....*albipes* Bigot.
- Anterior femora or tibiae with brown or black band.....2.
2. Abdomen without yellow markings.....3.
- Abdomen with yellow spots or bands (sometimes small).....6.
3. Front tibiae wholly yellow; face scarcely produced.....*distincta* Williston.
- Front tibiae annulate with black or brown; epistoma moderately or strongly produced.....4.
4. Face oblique, evenly produced to tip of epistoma.....*sphaerophoria*, n. sp.
- Face perpendicular or almost so above, the lower part conspicuously produced.....5.
5. Front almost as wide as long; the lower part of the face very strongly produced, abdomen bronze-black.....*conica*, n. sp.
- Front distinctly longer than wide, abdomen greenish black, smaller species.....*minuta*, n. sp.
6. Only the second abdominal segment with a pair of yellow spots.....
metallica Williston.
- Either with four pairs of spots or two bands or only the third segment maculate.....7.
7. Second and third segments each with a pair of spots or bands.....10.
- Only the third segment with a pair of spots.....8.
8. Front tibiae entirely yellow, hind femora of normal size.....*distincta* Williston.
- Front tibiae with black band, hind femora unusually swollen.....9.
9. Face oblique, scarcely concave.....*sphaerophoria*, n. sp.
- Face distinctly, though not strongly concave.....*macrofemoralis*, n. sp.
10. Front femora yellow on basal fourth or more; face evenly greyish white pruinose.....*globosa* Walker.

Front femora with less than the basal fourth yellow, usually black to the base; face usually shining black towards the sides....*metallica* Williston.

Neoascia subchalybea, new species.

Front blue-black, wider than one eye; face deeply concave, almost flat on upper fourth, very strongly produced; antennae wholly black; legs much darker than usual.

Length, 5 mm. *Male*: Face blue-black, moderately whitish pollinose, the white pile conspicuous, in profile almost flat on upper fourth and level with the eyes, thence obliquely produced to the lower fourth, thence much more strongly produced to apex, this lower portion being almost parallel with the oral margin below, the lower margin slightly oblique. Front slightly over one-third as wide as the head, blue black, with blackish pile, wholly gently convex, a small, longitudinal median depression. Occiput blue-black, black pilose on upper half, white below. Antennae wholly blackish brown, third joint oval, one and one-half as long as wide, rather flattened above; arista about as long as third joint, thickened on basal half.

Thorax blue-black, the pleura polished black below; pile of moderate length, whitish.

Coxae blue-black, the front ones more brownish. Femora black, the front four very narrowly, obscurely reddish at base, their apices reddish, hind ones with the basal sixth reddish; trochanters mostly brownish. Tibiae blackish, only the narrow bases and very narrow apices reddish. Tarsi brownish yellow. Posterior femora six times as long as wide.

Wings cinereous hyaline; stigma luteous; discal crossvein very slightly oblique, slightly sinuous; apical crossvein oblique and slightly curved outwardly, its junction with the fourth vein angularly rounded. Abdomen wholly steel blue, its disc scarcely darker, its pile wholly whitish.

Holotype.—♂, Montreal, Quebec, May 20, 1906. No. 619 in Canadian National Collection.

Quite distinct from any other species on account of the wide front, black pilose occiput, small size and bluish color. The wide front at once distinguishes it from *minuta* which has a narrow front and yellow haired occiput.

Neoascia minuta, new species.

Small, wholly dark species, the abdomen bluish with polished, greenish blue terminal segment, face almost evenly concave but less strongly so above.

Length, 4 to 5 mm. *Male*: Face black, densely greyish yellow pollinose, its whitish pile conspicuous; in profile almost evenly concave, less strongly so above, the oral margin as prominent as the apex of the second antennal joint; face sometimes more flattened on upper two-thirds and the oral margin less prominent. Front about one-fifth the width of the head, one and one-half times as long as wide, bluish but with a brassy reflection in middle; pile black, yellow on lower third. Occiput greenish or bluish-black, with yellowish pile, which becomes white below, the occipital cilia black or largely yellow. Antennae black, third joint reddish on lower basal half; arista brown, thickened

on basal fourth, about as long as third joint; third antennal joint elongate oval, one and one-half times as long as wide.

Thorax greenish black, the lower half of the pleura blue-black; pile short, yellowish. Coxae black, the front ones more brownish. Front four femora black, their apices broadly yellow, their bases very narrowly obscurely so; hind femora greenish black with the basal sixth or less, and narrow apex, reddish. Tibiae yellow on basal two-fifths and apex. Tarsi yellow, posterior basitarsi, and last two joints of hind tarsi, black; anterior basitarsi, last two segments of front four tarsi and middle two of hind tarsi reddish brown. Posterior femora about four and one-half times longer than wide, widest at middle.

Wings slightly tinged with brownish; stigma luteous; discal crossvein rectangular or nearly so; apical crossvein recurrent, slightly curved, its junction with the fourth vein sharply rounded.

Abdomen blue-black, its margins and last segment metallic greenish black. Pile yellowish; a narrow apical incomplete fascia of black pile on second and third segments.

Female: Front one-fourth the width of the head; occipital cilia yellow; face slightly variable in profile, more flattened on upper three-fourths than in the type ♂ and more like the paratype.

Legs more evidently paler, the femora all narrowly pale. Posterior femora slightly narrower.

Holotype and *allotype*.— ♂, ♀, "Colorado," No. 28169 in U. S. N. M.

Paratypes.— ♂, ♀; same data, No. 621 in Canadian National Collection, Ottawa. One paratype in U. S. N. M.

The small size of this species renders it conspicuous. While occasional specimens of other species may be as small, their specific characters, coloration, etc., will readily distinguish them. The specimens were included with *N. distincta* Williston in the National Museum collection but that species has wholly yellow front tibiae.

***Neoscia distincta* Williston.**

Neoscia distincta Williston, Syn., p. 112, 1886.

Female wholly black, rarely with an interrupted reddish fascia on the third segment; ♂ always with a reddish fascia; terminal abdominal segments metallic; front and middle tibiae wholly yellow.

Length, 4 to 5.5 mm. *Male*: Head black; face densely silvery white pruinose, entirely obscuring the ground color; in profile perpendicular on the upper two-thirds, thence produced to the tip of the oral margin which is about as prominent as the apex of the first antennal joint; hairs about the oral opening very indistinct. Front below with a few transverse striae and just above these numerous longitudinal, less distinct ones, the middle more or less brassy. Pile yellowish on lower half, black above. Occiput greenish black, lightly dusted; pile pale yellowish. Antennae brown, third joint reddish below on basal half, slightly over twice as long as wide, its apex obtusely rounded, inclined to be truncate above; arista brownish, thickened on basal third, as long as third joint.

Thorax blackish green, pale yellow pilose; pleura lightly whitish pruinose on upper half, and with whitish pile.

Coxae black, their tips, trochanters, base of hind femora, broad apices of the front four and tips of the hind ones and the tibiae and tarsi yellow; femora, hind basitarsi and last segment of hind tarsi black. Hind tibiae with narrow brown ring beyond the middle, the anterior four slightly darker.

Wings hyaline, stigma yellow. Discal crossvein rectangular, the apical one a little oblique so that the first posterior cell is slightly longer anteriorly and the crossvein is slightly curved.

Abdomen deep bluish-black, the sides bronzed, the last segment metallic greenish with a strong brassy reflection. Third segment with a basal yellow band occupying a little more than half the segment but well separated from the lateral margin. Pile of abdomen pale yellowish, but small apical triangles on the disc of the second and third segments, black.

Female: Face and front wider; the former with the pollen not nearly so abundant and the hairs about the mouth more distinct. Front slightly bronzed, purplish or greenish, with pale yellow pile except across the ocellar triangle.

Abdomen sometimes with the third and following segments slightly purplish bronzed or greenish or with the third segment black except the sides.

A female taken on May 5, in company with the others, may belong here: the face is slightly more evenly produced and the third abdominal segment has a basal interrupted reddish yellow fascia.

Over 50 specimens from Ontario and Quebec (Curran); ♀, Coldstream, Ont., May 25, 1922 (A. A. Wood).

I took a series of over fifty specimens of this species at Orillia in 1921 and recognized it as distinct from *globosa* Walker at that time, but identified it as *metallica* Williston.

***Neoascia unifasciata*, new species.**

Face strongly produced; third abdominal segment in both sexes with an entire or subinterrupted reddish yellow basal fascia; anterior four tibiae with blackish bands; second and third joints of hind tarsi yellow.

Length, 4.5 mm. *Male:* Face densely pale greyish yellow pruinose, with conspicuous hairs along the mouth opening; in profile gradually produced from the upper fourth, so that the anterior oral margin is almost as prominent as the tip of the second joint of the antennae (when porrect), very slightly concave. Front shining black, with a brassy reflection, its pile pale below and at the vertex, black or brown on upper two-thirds; on the middle with a few transverse, faint wrinkles, but no longitudinal ones. Occiput thinly greyish pruinose, with white hair below, yellowish above; occipital cilia not black. Antennae black; third joint brown, reddish below, scarcely longer than broad, its end obtusely rounded; arista almost as long as the last two joints combined, brown, with a yellow base.

Thorax shining greenish black, the pleura and sides of the dorsum with whitish pollen and pile; the disc of the latter with black pile, bordered by tawny and of a darker, more bronze ground color.

Coxae black, their apices broadly, trochanters, bases of femora, broad apices of the front four and narrow apices of the hind femora, basal half and apices of the tibiae, and all the tarsi pale yellow, first and last two joints of the front and hind tarsi and last two of the middle ones, black or brown; basal fourth of hind femora yellow.

Wings slightly fuscous; stigma fuscous; posterior angle of first posterior cell rounded, its crossvein rectangular; discal crossvein almost rectangular.

Abdomen deep black, the second segment with rather abundant, short, appressed brownish yellow hair, giving a dirty appearance to the segment; fourth segment metallic greenish black. Pile on the base and sides whitish; elsewhere yellowish; third segment with a transverse yellow fascia on the base, occupying slightly over half the length of the segment and not quite reaching the side margins.

Female: Face less densely pruinose; front without wrinkles or striae; with the usual transverse depression and a rather conspicuous longitudinal groove above; pile wholly shorter; third antennal joint nearly one and one-half times as long as broad.

No black pile on the thorax, that on the disc tawny.

Yellow abdominal band subinterrupted by a black projection in the middle posteriorly, and almost or just reaching the lateral margins.

Holotype.— ♂, Aweme, Man., August 11, 1917 (N. Criddle), No. 548, in the Canadian National Collection, Ottawa.

Allotype.— ♀, collected by Mrs. W. W. Hippisley, at Dauphin, Man.

This species is closely related to *conica* but is readily distinguished by the less concave face, shorter antennae and yellow median segments of the hind tarsi, although this latter character may be variable. The wings are darker and the female of *conica* has no yellow abdominal fascia.

***Neoascia conica*, new species.**

Abdomen of male with a yellow fascia on the base of the third segment; of female wholly black; face strongly produced, antennae short; tibiae with black bands.

Length, 5.5 mm. *Male*: Face densely pale yellowish pruinose, somewhat less so below; the pale hairs extending broadly to the lower side margins; in profile concave on upper fourth, thence produced, the production more marked below, so that there is a very evident concavity; the oral tip as prominent as the base of the arista when antennae porrect. Front shining greenish black, the middle brassy; without striae or wrinkles; brown pilose except on the sides below. Occiput very thinly whitish pruinose, its pile yellow, including the occipital cilia. Antennae black; third joint reddish beneath; about one and one-half times as long as wide. Arista black.

Thorax shining greenish black, its disc somewhat brassy; pile yellowish; a broad sub-median, abbreviated stripe black, especially noticeable behind the middle; pleura thinly whitish pruinose, with white pile.

Tips of the front coxae, all the trochanters and narrow bases of the femora, the hind ones more broadly, apices of the femora, the hind ones narrowly, basal

half and apices of the tibiae, middle two joints of the front, basal three of the middle tarsi and under side of median joints of the hind ones yellow; elsewhere black.

Wings cinereous hyaline; stigma pale yellow. Apical and discal crossveins rectangular, the posterior angle of the first posterior cell not or scarcely rounded.

Abdomen blue black; fourth segment metallic greenish black; basal reddish yellow fascia of the third segment occupying about half the length and distinctly separated from the side margins by a metallic greenish stripe. Pile on base, side margins and most of the fourth segment, whitish; on the disc, blackish, less widely so on the anterior of the second and third segments.

Female: Face thinly whitish pruinose, in profile less prominent on the upper portion, the lower portion produced as much as in the male, the concavity therefore much more evident. Front broader and somewhat swollen, the transverse depression incomplete, the longitudinal groove broad and deep; pile black across the ocellar triangle, elsewhere whitish; front unicolorous, slightly bronzed.

Thorax wholly whitish pilose. Apical crossvein with a slight curve at posterior corner of first posterior cell.

Abdomen wholly bronze-black, with whitish pile; rather robust.

Holotype.— ♂, Banff, Alta., June 1, 1922 (C. B. D. Garrett), No. 549, in the Canadian National Collection, Ottawa.

Allotype.— ♀, Banff, May 29, 1922 (C. B. D. Garrett).

This species was possibly included by Williston under his *metallica*. It is quite distinct from all others, its outstanding characteristic being the remarkably produced face and short third antennal joint.

***Neosciasia sphaerophoria*, new species.**

Male with an interrupted or entire basal reddish fascia on third abdominal segment; female with an obscure fascia; tibiae with black bands; ♂ genitalia very large.

Length, 5 to 5.5 mm. Face yellow pruinose, the whitish hairs above the oral margin very distinct and extending to the side margins, in profile strongly produced from the upper fifth, not concave, the tip of the oral margin about as prominent as the apex of the second antennal joint when the antennae are perfect. Front shining black, more or less brassy or bronzed; below with a few transverse wrinkles; brown pilose except on the sides below; occiput thinly yellowish pruinose; yellow pilose. Antennae black; third joint brown; yellow on basal half below; third joint almost twice as long as broad, its apex obtusely rounded, never inclined to an angle above; arista black.

Thorax shining greenish black, with tawny pile; that on the disc mostly black; on the pleura more whitish.

Coxae with the tips of the front ones, trochanters, bases of hind femora; apices of the front four and sometimes the hind ones narrowly, basal third or less of the tibiae and their apices, first three joints of the middle tarsi and median two of the front ones, more or less yellow or whitish; legs otherwise black.

Wings cinereous hyaline, stigma pale yellow; apical and discal crossveins rectangular, the posterior angle of the first posterior cell angular or slightly rounded.

Abdomen bluish-black, the fourth segment metallic, sometimes bronzed or brassy; the basal reddish yellow fascia on the third segment may be broadly interrupted in the middle or entire and reaches the lateral margin or almost so. Pile rather long, yellowish; on the posterior half of the second, and third and base of the fourth segments, black, but nowhere reaching the sides. Genitalia unusually large.

Female: Facial pollen paler, whitish, and much less abundant; front yellow pilose on lower half and at vertex; in the middle with a conspicuous depression.

Thorax wholly yellow pilose on the dorsum. The spots on the abdomen are not reddish, but are metallic.

Holotype.—♂, Banff, Alta., June 15, 1922 (C. B. D. Garrett); No. 547, in the Canadian National Collection, Ottawa.

Allotype.—♀, same locality, June 1, 1922.

Paratypes.—5♂, same locality, May 27th to June 16th, 1922.

The large genitalia of the male are quite distinctive. The longer antennae, large posterior femora, two-spotted or immaculate abdomen, and straight produced face distinguish the female from allied species.

***Neoascia macrofemoralis*, new species.**

Large species, the face evenly produced to tip of oral margin; posterior femora larger than in most other species; third abdominal segment with an entire basal fascia (♂), a broadly interrupted fascia (♀).

Length, 5.5 to 6 mm. *Male*: Face brassy black, moderately covered with greyish yellow pollen; in profile almost evenly produced to the tip of the oral margin, narrowly flattened just below the antennae where it is almost on a level with the eyes, lower margin slightly evenly produced downwards. The short, sparse, white facial pile extends down nearly to the oral margin of the slopes. Front nearly twice as long as wide, strongly brassy, the supra-antennal depression large, with a few oblique striae below; pile short, black across the ocelli, elsewhere yellow. Occiput greenish black, with almost white pile. Antennae black, the third joint reddish on basal half below; in outline the third joint oval, one and one-half times as long as wide; arista as long as third joint, thickened on basal half.

Mesonotum black, slightly bronzed, with very short whitish pile; pleura black, brassy above, their pile white; scutellum rather brassy, with yellowish pile.

Coxae black, the apices of the front four yellow. Front four femora black, their very narrow bases and broad apices reddish yellow; posterior femora with the basal fourth and very narrow apex reddish yellow; tibiae with the basal third or more and the apices, reddish yellow, tarsi yellow, the last two joints and hind basitarsi black; front four basitarsi and median joints of hind tarsi more or less fuscous above. Posterior femora greatly swollen, widest at the middle, about three times as long as wide.

Wings cinereous hyaline, stigma luteous, discal and apical crossveins rectangular, very slightly curved.

Abdomen deep bluish-black, the sides bluish; the last segment metallic, blackish green; third segment with a reddish fascia which reaches the sides in its full width, and occupies about the basal half of the segment. Pile chiefly whitish; black on apical half of second, and third segments except laterally. Fifth sternite as long as wide, the genitalia normal, rather flat, not swollen.

Female: Face distinctly concave, the lower part more strongly produced than in the ♂; front wider, one and one-fourth as long as wide.

Posterior femora smaller than in ♂ but distinctly larger than in most species.

The fascia on the third abdominal segment is broadly separated from the side margins and is interrupted in the middle by a distance almost equal to the length of one of the spots; in width the spots occupy about the basal third of the segment.

Holotype.— ♂, Popoff Island, Alaska, July, 1899 (T. Kincaid); Harriman Alaska Expedition, No. 28170 in U. S. N. M.

Allotype.— ♀, same data.

Paratype.— ♀, same data, No. 620, in the Canadian National Collection, Ottawa.

This species is closely related to *N. sphaerophoria*, but the male is readily distinguished by the small, not swollen genitalia. The female can not be readily separated from *sphaerophoria* female, but the face is distinctly concave and it is slightly larger. The legs are practically the same in both these species.

***Neoascia metallica* Williston.**

Ascia metallica Williston, Pr. Phil. Soc. XX, 35, 1882.

Ascia nasuta Bigot, An. Ent. Soc. Fr., 327, 1883.

Ascia quadrinotata Bigot, l. c.

Neoascia globosa var. *metallica*, Willst. Syn., 112, 1886.

Abdomen with two bands or four spots; rarely with only two spots on the second segment; tibiae with black bands, anterior femora black to base or only narrowly yellow basally; face of ♀ usually shining.

Length, 4.5 to 6 mm. *Male*: Face thickly pale yellowish pruinose, the whitish hairs above the oral opening extending to the side margins and rather conspicuous; in profile perpendicular on the upper fourth, thence strongly produced, the tip of the oral margin about as prominent as the middle of the second antennal joint when antennae are porrect; the lower portion almost straight but usually very slightly concave. Often the eyes obscure a view of the upper portion of the face from direct lateral view. Rarely the upper half of the face is perpendicular in which case the lower portion is distinctly concave. Front shining black, distinctly bronzed; polished in the middle on the lower fourth, above which, on either side are four or five longitudinal striae. Pile black; on the sides below and on the occiput pale yellow or whitish. Occiput thinly greyish pruinose along the eyes. Antennae black; third joint, reddish at base below, twice as long as wide, its end evenly obtusely rounded; arista black.

Thorax metallic greenish black, the lower half of the pleura shining black, the upper half thinly whitish pruinose. Pile yellowish, including the pleura; black on the disc.

Legs black; apices of coxae, most of trochanters; anterior femora beneath basally, sometimes the narrow base, bases of middle femora, apices of anterior four femora and rarely the narrow apices of hind ones, almost the basal half of the tibiae and their apices, first four joints of anterior four tarsi and the hind ones beneath, yellowish; last joint of front tarsi, disc of their basitarsi and last two joints of the middle ones, brownish; middle joints of hind tarsi rarely yellowish. Broad bases of hind femora yellowish.

Wings cinerous hyaline; stigma yellow. First posterior cell a little rounded postero-apically; the apical crossvein almost rectangular or slightly bulged; discal crossvein almost rectangular.

Abdomen deep black; somewhat bluish on the disc; fourth segment greenish black, metallic. Second segment with an entire, broad, orange crossband situated a little behind the middle, its anterior margin arched, but often with a broad median emargination and there may be an emargination on the usually transverse posterior margin. Band on the third segment, occupying over the basal half, its posterior border usually straight, but sometimes emitting an incomplete dash forwards, which may be disconnected leaving a longitudinal oval spot. The bands do not reach the lateral margin but are broadly separated from it although the posterior one approaches it more behind. Pile yellow; black on posterior of second, third and base of fourth segments, but the black pile does not reach the lateral margins.

Female: Face usually perpendicular on the upper two-thirds, thence rather suddenly produced, but sometimes not so abruptly; usually mostly shining black, with a narrow median, thinly pollinose stripe which expands a little below and above, but sometimes chiefly pale yellowish or whitish pollinose with an oval shining area on each side which more often connects with the shining cheeks. Front shining, rather polished black, with a rather deep median longitudinal depression which is broadened a little below the middle. Pile black on upper third or fourth.

Pile of thorax shorter. Discal crossvein usually curved outward near its end.

Abdomen with the side margins and terminal segments usually bronzed, sometimes metallic greenish black; rarely with only two spots, on the second segment. Usually the band on the second segment is entire, or sub-interrupted, but frequently interrupted; the band on the third segment may be broadly subinterrupted or interrupted and the spots may be greatly reduced in some cases.

Described from 50 specimens from Banff, Alta., (C. B. D. Garrett), Monroe, Washington; Corvallis, Oregon; Alaska and Colorado.

As suspected by Bigot, *quadrinotata* is a color variety of *nasuta*, but is perhaps entitled to varietal rank as there seem to be slight differences, especially in color of the abdomen, those with the bronzed abdomen being typical *quadrinotata*. This species is readily distinguished from *globosa* by the more black anterior femora, facial profile, etc. As *nasuta* is clearly *metal-*

lica Willist., both Bigot's names must be relegated to the synonymy.

***Neoascia globosa* Walker.**

Ascia globosa Walker, List III, 546.

Neoascia globosa Williston, Syn., p. 111, 1886.

Abdomen with two bands or four spots; front femora yellow on nearly the basal third; face pale yellowish pruinose.

Length, 4 to 5.2 mm. *Male*: Face pale yellowish pruinose, the hairs below confined to just above the lateral oral opening; in profile produced from the upper third or fourth, the lower portion not or scarcely concave, the tip of the oral margin almost as prominent as the tip of the second antennal joint when the antennae are porrect. Front shining greenish black, sometimes brassy in the middle; on the lower part with two or three transverse striae and numerous longitudinal ones above these; pile black, except along the eyes below. Occiput blue black, with yellow pile above, whitish below. Antennae black, third joint reddish below, twice as long as broad.

Thorax shining greenish black, pleura lightly greyish pruinose above; pile pale yellowish; on the disc black; on the pleura white.

Legs whitish yellow; hind femora on the apical two-thirds except the tip, a broad median band on the front four femora; a median band on the front, a broad subapical one on the middle and the hind tibiae except the broad base and apex and superior surface of hind basitarsi black; last two joints of hind tarsi brownish.

Wings lightly fuscous; stigma yellow; apical crossvein slightly curved, its anterior end usually curved towards the base of the wing, the posterior angle of the first posterior cell rounded.

Abdomen deep black, the fourth segment except the base metallic greenish or brassy; on the middle of the second segment with a broad yellow band which may be broadly interrupted in the middle, sinuate in front or entire. The band on the third segment is basal, occupies nearly two-thirds of the segment and may be sub-interrupted, but usually bears an oval spot about its middle. Both bands are broadly separated from the lateral margin. Pile yellowish, not very long; black on the posterior margins of the second and third segments and narrow base of the fourth.

Female: Face with silvery white, less abundant pollen; front without wrinkles, with a deep, broad, longitudinal depression and sometimes a shallow transverse one; pile tawny.

Thorax with more tawny pile on the notum.

First abdominal band always interrupted, the second always sub-interrupted or interrupted and not so wide.

Described from 25 specimens of both sexes, from St. Johns, Que.; Hull, Que.; Ottawa, Ont.; Orillia, Ont.; Toronto, Ont.; Sturgeon Bay, Wis., Madison, Wis.; Maine and Massachusetts.

This species is quite distinct from others which I have seen and may be readily distinguished by the more extensively yellow legs and rather uniform abdominal spots. It seems to be eastern in distribution. I have not found it commonly in

Ontario, but have taken five or six specimens. *N. albipes* has wholly pale front and middle legs. The ♀ from Maine has unusually dark legs and might be confused with *metallica*; one Massachusetts ♂ is similar, but *metallica* is a mountain form and in cases of doubt locality must bear an important part, but the ♂ of *metallica* never has an interrupted abdominal fascia on the third segment, while *globosa* always has one when the legs are darker than usual.

***Neoscia albipes* Bigot.**

Ascia albipes Bigot, An. Soc. Ent. Fr., 328, 1883,
Neoscia globosa var. *albipes* Williston Syn., 112, 1886.

Allied to *N. globosa* but the front four legs are wholly yellow, the third joint of the antennae is three times as long as wide, the abdomen is adorned with two reddish fascia which may be interrupted or entire, the front is one-fourth the width of the head and the hind femora are slightly larger.

Seven specimens of both sexes from Pennsylvania and New Jersey. Williston recorded it from Connecticut.

This species is so distinct that I do not describe it in detail. *N. globosa* has the front only one-fifth the width of the head, the third antennal joint twice as long as wide and the front legs always with black bands.

TWO NEW SPECIES OF CENTRAL AMERICAN MELASIDAE (COLEOPTERA).

BY H. S. BARBER, U. S. Bureau of Entomology.

Two conspicuous species of Central American Melasidae, received for identification, appear to be new and are described below. In the tables of genera of this family by Fleutiaux, 1920, they appear to belong in *Gastraulacus* and *Temnillus* but a perusal of the descriptions in connection with the specimens before me leads to the belief that *G. atratus* Guérin, 1843, is not a synonym of the briefly characterized Brazilian species *G. bisulcatus* Latr., 1834, and that other species may also have been confused under the name of the latter.

The remarkable metasternal and abdominal grooves for the reception of the middle and hind tarsi attracted the attention of Latrielle whose incomplete notes were published after his death and established the Brazilian species as *Galba bisulcatus*. Nine years later this species was chosen as type of a new genus, *Gastraulacus* Guérin-Ménéville, 1843, including also two new species. Bonvouloir, 1870, suppressed the first of these latter, *atratus*, as a synonym of *bisulcatus* and made the second, *leprieuri*, the type of a new genus, *Temnillus*, chiefly because the

eye is divided by a lateral production of the supraantennal carina. This synonymy has remained unquestioned since that time.

Dichotomous distinctions can not be taken from the published descriptions, but such characters as are available are included in the following table as perhaps of more use than detached comments.

Key to Species of Gastraulacus and Temnillus.

1. Eye without dividing carina; propleurae with deep triangular impression (*Gastraulacus*).....2.
 Eye divided by nearly complete canthus; propleurae not impressed. (*Temnillus*).....6.
2. Metasternal sulci not convergent posteriorly.....3.
 Metasternal sulci convergent posteriorly, extending from outer front angles of metasternum to near the middle of the posterior margin.....5.
3. Third antennal joint more than twice as long as second; last joint very short, strongly transverse and internally produced at apex. Head with two strong impressions in front. Pronotum with slight median impression at base. Length, 9 mm., Mexico and Columbia.....*atratus* Guérin.
 Third antennal joint shorter.....4.
4. Second and third antennal joints almost equal, cylindrical. Last joint notably larger than the preceding, thick and almost transversely square with the extremity rounded. Length about 12 mm. Brazil.....
bisulcatus Latreille.
 Antennal joint 2 wider and longer than 3d; 3 to 10 strongly transverse, together only twice as long as thickened part of joint 1, the last joint subtriangularly rounded and about twice as long as 10th. Upper surface coarsely punctate with erect pubescence, subtuberculate, opaque between the shining tubercles. Front with deep impression between antennal sockets extending faintly to vertex. Pronotum with faint basal impression, an obsolescent impression at middle, and a pair of nontuberculate impressions half way between the latter and the sides and a strong fovea near the hind angles. Scutellum subquadrate, the hind angles and margin rounded. Elytral striae represented by irregular series of coarse abrupt shining foveae becoming very coarse apically in the sutural and marginal series. Side margins of last three abdominal segments not covered by elytra and conspicuous from above. Underside shining, with coarse punctures each enclosing a prostrate hair; the last sternite with two vaguely limited basal impressions expanding posteriorly into larger impunctate areas, a pair of deep foveae at apical fourth, apex broadly rounded. Length, 9.8 mm. Width, 3.4 mm. Costa Rica
***Gastraulacus nevermanni*, new species.**
5. Subopaque, granulate; head deeply impressed from occiput to base of clypeus; pronotal median impression extending from near base to anterior fourth, sharp posteriorly, broader anteriorly; elytral interstices feebly convex, transversely wrinkled. Length, 13.5 mm. Chontales, Nicaragua.....*cavifrons* Horn.

6. Form more robust, shining, densely punctured and shagreened; head flattened anteriorly with (front?) slightly excavated; pronotum with feeble posterior and median trace of longitudinal fossa. Scutellum square with posterior margin rounded; elytral intervals punctate and shagreened. Under surface strongly punctured. Length, 7 mm. Width, 3 mm. Cayenne.....*Temnillus leprieuri* Guérin.

Form more elongate, opaque, finely, densely acciculate punctate, with microscopic hairs. Occiput broadly impressed at middle, the impression joining a deep chevron-shaped impression between antennal sockets. Clypeal margin produced into a narrow but well developed median lobe. Basal antennal joint longer than joints 2-6 combined, the 2d one-half as long as 3d, 4th to 10th slightly shorter than 3d and slightly transverse, 11th subquadrate with lower apical angle produced. Pronotum with feeble median impression extending from near base to apical fourth; disc slightly gibbous on each side. Scutellum slightly wider than long, sides straight and convergent posteriorly, becoming evenly rounded. Elytra distinctly sulcate, the striae confluent punctate, deeper behind, intervals hardly convex. Underside feebly shining, densely punctate, prosternum abruptly truncate behind, the last sternite with minute vestiges of the tarsal grooves at base and with strong impressions on each side near apex, leaving a median ridge which meets the underside of the strongly produced pygidium. Length, 11.5 mm. Width, 4.1 mm. Chiapas, Méx.....***Temnillus mexicanus***, new species.

The four specimens of *Gastraulacus nevermanni* before me are from a series cut from their cells in the dead part of a standing tree in the forest at Santa Clara, 250 meters altitude, north of the Colombiana Farm and 10 km. west of Siquirres, on the Atlantic Slope, Costa Rica, Apr. 13, 1924, by Ferdinand Nevermann, in whose honor the name has been given.

Type and paratypes.—Cat. no. 27857, U. S. N. M.

The unique specimen of *Temnillus mexicanus* was collected at an altitude of 800-1,000 meters on the Pacific Slope of the Cordilleras in Chiapas, Mexico, in 1919, by L. Hotzen.

Type.—Cat. no. 27858, U. S. National Museum.

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EDITORIAL.

To the thinking man it is almost self-evident that the finest fruits of Art or Science are the products of leisure. They ripen slowly and when forced lose something in flavor and quality. It is well for us to bear this in mind as we strive to direct Science into ways of social service—to make it “practical,” “economic.” There is always a danger—a very slight danger perhaps but nevertheless a very real danger—that in endeavoring to make it immediately valuable we may make it ultimately valueless. We may produce a large fruit crop that will appease a present hunger, but that will give little nourishment. This is no argument against any “economic” science, nor even against Science economically directed. It is a caution to those who may be tempted to make Science completely subservient to Economics.

Obviously the first business of a man is to live; but it is not his sole nor greatest business. He must live in some manner conformable with Truth. Similarly as regards Science. Her one business is to serve human necessity; for if she do not this then there is no ethical justification for her whatever. But her other and greater business is the seeking of Truth for its own sake. With such a two-fold understanding we admit at once the possibility of a conflict of interests in both the human and scientific worlds. Just as a man, who wishes to live as he should, must be ready to sacrifice his life; so Science, that would be of the greatest service, must sometimes give the search for Truth precedence over the economic problem of the moment.

There is no need to stress the point. As far as Science is concerned, conflict between the ideal and the practical is imminent only if we insist upon reducing scientific study to a purely utilitarian basis. In that event freedom disappears and with it the opportunity for any lasting or finally valuable contribution.

So much for generalities. The point of the argument is this: that those who support science—the government, the corporations, the public—should recognize the need of purely scientific research and provide for it generously. Science should be subsidized as Science, not merely as an adjunct to agriculture, industry, commerce or health; and the scientist should be assured of sufficient leisure for the most far-reaching investigations.

He on his part must not forget his obligation as a public servant; but in his endeavor to serve he should also be careful not to confound service with servitude.

—*Carl Heinrich.*

NOTES AND NEWS ITEMS.

The Casey Bequest to the National Collection.—The entire bequest of Col. Thomas L. Casey to the National Museum consisted of his collections in entomology, conchology and Tertiary fossils, together with his library on these subjects.

The entomological portion of the collections was by far the most important, representing his life work on Coleoptera. He had accumulated some 16,000 species of beetles, approximately one-third being of his own describing, represented by his types. The collection has been received at the Museum and is temporarily stored pending the assignment of a suitable room where it can be installed, the types labeled and recorded, and the other species also labeled so as to show Colonel Casey's interpretation of them. It will be some time before the larger part will be ready for study by specialists, although it is hoped that some groups of especial interest, on account of investigations in progress, can be prepared in a few months.

The collection is by far the largest gift of insects ever received by the National Museum.

The entomological library is very complete for the order Coleoptera, and contains also some valuable sets of periodicals; a set of the Proceedings of the Academy of Natural Sciences of Philadelphia from its beginning over a century ago is the most notable of these. The set of Annales of the French Entomological Society begins at 1860. There are also some publications on other orders of insects.

—J. M. Aldrich.

PROCEEDINGS
OF THE
ENTOMOLOGICAL SOCIETY
OF WASHINGTON

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PAUL REVERE MYERS.

PROCEEDINGS OF THE
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In Memoriam

The following resolutions were adopted by the Entomological Society of Washington on March 11, 1925.

Whereas the Entomological Society of Washington has lost by death one of its most beloved members, Paul Revere Myers, and

Whereas Mr. Myers was a member of long standing in the Society and had by his contributions to its proceedings and participation in its affairs added to the interest of its meetings and the importance of its publications, and

Whereas his sunny disposition, friendly personality, and sterling worth of character had endeared him to all of the members of the Society, therefore

Be it resolved that in the untimely death of Mr. Myers the Society has suffered a grievous loss; that the field of systematic entomology has been deprived of one of its most promising young workers in a branch that can ill afford such deprivation, and

Be it further resolved that the members of the Society who loved and admired him will always be inspired by the memory of his devotion to Science, his willingness to aid others, and his indefatigable zeal in the performance of duty.

Be it further resolved that a sketch of Mr. Myers' life (including bibliography) be prepared for publication in the Proceedings of the Society, and that copies of these resolutions be sent, with an expression of deep and sincere sympathy, to his family.

PAUL REVERE MYERS

BY W. R. WALTON, A. B. GAHAN AND J. A. HYSLOP.

The many friends of Mr. P. R. Myers, in charge of the Hessian Fly Laboratory of the Federal Bureau of Entomology at Carlisle, Pennsylvania, will be deeply grieved to learn of his death which occurred at 12:30 p. m. on February 12 last. Mr. Myers was seized with septic pneumonia on February 5, and although he had the benefit of all that medical science could offer, its aid did not avail and he failed to rally.

Paul Revere Myers was born at Harrisburg, Pennsylvania, February 15, 1888, and received his basic education in the public schools of that city. Mr. Myers took a keen and active interest in natural history even in his extreme youth, and when but 19 years of age was appointed as an assistant in the Pennsylvania Bureau of Economic Zoology at Harrisburg. Here he was associated with a group of enthusiastic young entomologists and zoologists, most of whom have since become well known either in applied or research entomology. A flood of miscellaneous zoological material constantly passed through the laboratory in which Mr. Myers was employed, including specimens of the Pennsylvania fauna ranging from the arthropods to the mammals. The identification and anatomical examination of this abundant material, together with his work in entomology, entailed a greater variety and amount of real zoological work than is to be had in the ordinary natural science courses of many of our colleges. Mr. Myers was engaged principally during this time in the rearing of insects under laboratory conditions, and after about two years of such service was appointed, on March 1, 1910, as Aid in the Division of Insects of the U. S. National Museum. The four years spent by Mr. Myers in this position had a profound effect in directing the course of his future in entomological work. His association there with the keen and highly trained taxonomists of the Bureau of Entomology stimulated his interest and influenced him to begin a serious study of the Hymenoptera, in which effort he was most generously aided by several members of the staff. During this time Mr. Myers aided importantly in the arrangement of the very large and constantly growing collection of Hymenoptera, while his naturally keen powers of observation soon permitted him to develop a good working knowledge of the order as a whole. After a time, the parasitic forms began to have an absorbing attraction for him, and at the end of his term of service in the Museum he determined to devote his whole attention to this group. With this end in view he secured through the late F. M. Webster on August 27, 1914, a transfer to the Bureau of Entomology, and was assigned to the study of the parasites of the Hessian fly under the late W. R. McConnell,

at Hagerstown, Maryland. At that time a comprehensive study of this parasitic complex had but recently started, hence Mr. Myers was able to enter this work at an opportune moment. Under the competent guidance of Mr. McConnell, who was a broadly trained zoologist as well as a research worker of marked acumen, Mr. Myers quickly developed into a parasitologist of most promising ability. So competent had he become, indeed, that upon the death of Mr. McConnell in June of 1920 Mr. Myers was placed in charge of the station which he had conducted with increasingly excellent results for nearly five years.

The dominant note of Mr. Myers' character was kindness to every person with whom he came into contact. Race, color, creed, or condition in life mattered naught to him. His sympathetic nature led him to take a really personal interest in every one he met. He constantly shed the light of cheerfulness as he passed, and had reduced the theory of the "brotherhood of man" to everyday practice.

Mr. Myers published several important papers dealing with the biology and taxonomy of the Hymenopterous parasites of the Hessian Fly and at the time of his death had but just completed a large manuscript entitled "A Synopsis of Hymenopterous Parasites Reared from the Hessian fly in the United States," which contains a key for the determination of the species, numerous illustrations, and much information of great value to entomologists engaged in the investigation of the Hessian Fly and to students of the Hymenoptera in general. Mr. Myers was a member of the American Association of Economic Entomologists, Entomological Society of Washington, Pennsylvania Academy of Science, and Entomological Society of America. He was married in Washington, D. C., April 19, 1911. His wife and two children, Kathryn, aged 12, and Paul, aged 3, survive at 556 West Louthier Street, Carlisle, Pennsylvania.

Mr. Myers' entomological publications are as follows:

- 1915 Results of the Yale-Peruvian Expedition of 1911. Addendum to the Hymenoptera Ichneumonides. Proc. U. S. Nat. Mus., v. 47, pp. 361-362. No. 2052.
- 1917 A New Parasite of the Hessian Fly (*Mayetiola destructor* Say). Proc. U. S. Nat. Mus., v. 53, pp. 255-257. No. 2204.
- 1917 An American Species of the Hymenopterous Genus *Wesmaelia* of Foerster. Proc. U. S. Nat. Mus., v. 53, pp. 293-294. No. 2206.
- 1921 Observations Relative to Recent Recoveries of *Pleurotropis epigonus*, with J. S. Wade. Proc. Ent. Soc. Wash., v. 23, No. 9, pp. 202-206.
- 1924 *Polyscelis modestus* Gahan, a Minor Parasite of the Hessian Fly. Jour. Agr. Res. v. 29, p. 289-296.
- 1924 The Identity of *Nemicromelus fulvipes* Forbes, a common Hessian fly Parasite. (In press.)
- A Synopsis of Hymenopterous Parasites Reared from the Hessian fly in the United States. (To be published.)
-

**A PHYLOGENETIC STUDY OF THE LABIUM OF HOLOMETA-
BOLOUS INSECTS, WITH PARTICULAR REFERENCE TO THE
DIPTERA.**BY G. C. CRAMPTON.¹

In the May, 1924, issue of these "Proceedings" Dr. A. D. MacGillivray criticises the views proposed by me in two previous papers (Crampton, 1921, and 1923), dealing with the labial structures of the Holometabola and the Diptera in particular. It is greatly to be regretted that Dr. MacGillivray's untimely death, which has dealt a heavy blow to the study of insect morphology in this country, has deprived his side of the argument of his able support; and it might perhaps be considered unfair to continue the discussion under these conditions. On the other hand it is commonly believed that "*qui tacet consentit*," and least by remaining silent, I should appear to admit that Dr. MacGillivray is justified in maintaining that my interpretations are erroneous, and that I have mistaken analogy for homology, as he claims, I would present herewith additional proof of the correctness of my interpretations, which appears to me to be absolutely incontestable and conclusive.

One of Dr. MacGillivray's criticisms is that I did not use the most primitive representatives of each order of the Holometabola to illustrate the evolutionary tendencies resulting in the production of the Dipterous type of labium. Due to their extreme rarity and great value, it is usually impossible to obtain for dissection the most primitive representatives of the different orders; but through the generous aid of Drs. J. W. Campbell and C. P. Alexander, and Mr. T. R. Harris, I have been able to make a study of *Tanyderus* (Fig. 3), which is generally admitted by Dipterists to be the most primitive living representative of the order Diptera; and Dr. R. J. Tillyard has very kindly given me specimens of *Chorista* (Fig. 18), which is considered to be one of the most primitive of living Mecoptera. Through the generosity of Messrs. S. A. Rowher and Wm. Middleton, I have obtained specimens of *Xyela* (Fig. 32), which is considered to be as primitive as any known Hymenopteron, while Dr. Campbell and Mr. Tapley have generously supplied me with specimens of the archaic Lepidopteran *Sabatinca* (Fig. 15), which I have been able to compare with specimens of *Micropteryx* from Dr. Buxton, and *Mnemonic*a from Dr. Busck. Dr. A. B. Champlain has very kindly given me specimens of the Coleopteran *Cupes* (Fig. 31); and since it is comparatively easy to obtain such primitive Coleoptera and Neuroptera as the Lampyridae, *Sialis*, *Corydalis*, etc., I have been able to

¹Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

meet Dr. MacGillivray's demands even in this difficult matter; and I would emphasize the fact that these primitive insects prove even more conclusively than do the forms I used before, the correctness of the views set forth in my former paper—and if Dr. MacGillivray could have studied these primitive insects, I feel confident that he would have been convinced by the unmistakable evidence they offer in support of the correctness of the conclusions set forth in my former papers!

Since Dr. MacGillivray's criticism was directed chiefly against my interpretation of the parts of the Dipterous labium, I have devoted the greater portion of the following reply to the discussion of the homologies of the labial structures of the Diptera. The most primitive representative of these insects, as was mentioned above, is *Tanyderus*. When the labium of this primitive Dipteran (Fig. 3) is compared with the labium of the Mecopteran shown in Fig. 2 (which is quite as primitive as the labium of the archaic Mecopteran shown in Fig. 18), the striking correspondence, even to the minutest details, is most astonishing, especially when we take into consideration the fact that the two insects in question belong to different groups of ordinal rank! Thus, the elongated mentum *mn* of the Dipteran shown in Fig. 3 corresponds in every way to the elongated mentum *mn* of the Mecopteran shown in Fig. 2. The palpigers *pgr* of the Dipteran shown in Fig. 3 are distinct distally, but unite basally, just as is the case with the palpigers *pgr* of the Mecopteran shown in Fig. 2. There are traces of two segments in the labial palpi *lp* of the Dipteran shown in Fig. 3, and there are but two segments in the labial palpi of the Mecopteran shown in Fig. 2. The two-segmented condition of the labial palpi of the Diptera, however, is better illustrated by the labial palpi *lp* of the Diptera shown in Figs. 7 and 4—but the correspondence in other details is not so marked as when the parts of the Dipteran shown in Fig. 3 are compared with those of the Mecopteran shown in Fig. 2. In fact, the only structure found in Fig. 3 which does not occur in Fig. 2 is the median structure *lg* situated between the labial palpi *lp* of Fig. 3. A comparison of the parts of Fig. 3 with Fig. 6 would indicate that the structure labelled *lg* in Fig. 3 is the ligula *lg* of Fig. 6, since the ligula *lg* is located between the labial palpi *lp* and is distal to the palpigers *pgr* in both insects. Now, the ligula *lg* of Fig. 6 (and consequently the ligula *lg* of Fig. 3) corresponds to the ligula *lg* of the other Coleopteran shown in Fig. 29, which is composed of the *paraglossae*, as is shown by comparing the latter with the ligula *lg* of the labium of such Coleoptera as the one shown in Fig. 10, which MacGillivray admits is composed of the united *paraglossae* and *glossae*. The *paraglossae* thus compose the ligula *lg* of Fig. 10, and of Fig. 29; and consequently the *paraglossae* compose the ligula *lg* of Fig. 6, and also

the ligula *lg* of the Dipteran shown in Fig. 3, which is homologous with the ligula *lg* of Fig. 6. It is thus quite clear that if the paraglossae are contained in the ligula *lg* of the Dipteran shown in Fig. 3, the paraglossae can not possibly be represented by the labial palpi *lp* of the Dipteran shown in Fig. 3, as MacGillivray claims, is the case in the Diptera!

I do not understand how any one could compare the series of insects shown in Figs. 1, 2, and 3, without coming to the inevitable conclusion that the elongated mentum *mn* is the same in all, that the palpigers *pgr* are the same in all, and that the labial palpi *lp* are the same in all. Dr. MacGillivray, however, thinks that I have been deceived by a false analogy, and that the obvious similarity is but a trap to ensnare the unwary! Strange to say, he considers that the tiny median structure *lg* of the Dipteran shown in Fig. 4 (which is homologous with the median structure *lg* of the Dipteran shown in Fig. 3) represents the ligula *lg* of the Neuropteran shown in Fig. 1, without realizing that this admission in itself precludes the possibility of regarding the labial palpi *lp* of Fig. 4 as "paraglossae"; for the paraglossae must be included in the median structure *lg* of Fig. 4 (and Fig. 3) if this structure is homologous with the ligula of Fig. 1, since a comparison of the Neuropteran shown in Fig. 1 (which is the same as the one shown in Fig. 25) with other Neuroptera such as those shown in Fig. 24 and Fig. 23, clearly shows that the ligula *lg* of Fig. 25 or Fig. 1, represents the paraglossae *pgl* of the ligulae *lg* of the Neuroptera shown in Figs. 24 and 23. The palpigers *pgr* of the three Neuroptera in question merely become approximated mesally and bring the bases of the palpi closer together as one runs through the series, and the result of this approximation of the palpigers and palpi, is to crowd the ligula *lg* (composed of the paraglossae) forward out of position; and this tendency for the palpigers (with their palpi) to become approximated mesally and crowd out the ligula (composed of the paraglossae), is exhibited in all of the Holometabola (compare the Coleopterous series shown in Figs. 27, 28 and 29, or the Hymenopterous series shown in Figs. 32, 33 and 34, and note the approximation of the bases of the palpigers *pgr* of the Lepidopteran and Trichopteran shown in Figs. 15 and 14). It is therefore merely to be expected that the same thing will occur in the Diptera also, since it occurs in all of their relatives, so that it is surely a reasonable assumption that in the Diptera shown in Figs. 3 and 4, the ligula *lg* (composed of the paraglossae as in all other Holometabola) is crowded out of position by the approximation of the palpigers *pgr* and labial palpi *lp*.

Dr. MacGillivray, while admitting that the median structure *lg* of the Dipteran shown in Fig. 4 (or Fig. 3) is the ligula, claims that this ligula, unlike that of any other Holometabola, is com-

posed of the united glossae alone, and that the Diptera, unlike any other Holometabola, or any other known insect for that matter, have retained a pair of enormously developed paraglossae, while their labial palpi disappear completely! One should be wary of postulates which assume a condition not known to occur in any other insect whatsoever, and in this case, one's doubts are amply justified!

Dr. MacGillivray seeks to strengthen his argument that the labella of the Diptera represent paraglossae rather than modified labial palpi, by citing the work of his student, Dr. Peterson, who, according to Dr. MacGillivray, "has simply followed Kellogg and a host of other workers" in interpreting the labella as paraglossae. Who this "host of other workers" may be, I do not know. Frey, 1921, cites Savigny, 1816, Menzbier, 1830, Newport, 1839, Bugnion and Goeldi, 1913 (Lang's "Handbuch"), and Peterson, 1916, as the defenders of the view that the labella represent paraglossae, while Brullé, 1844, regards them as glossae, and Wesche regards them as representing both glossae and paraglossae combined.

Dr. MacGillivray implies that his views are the same as those "of all modern writers, except Drs. Crampton and Tillyard, who have studied the labium of the Diptera"; but he is apparently unaware of the fact that many Continental Dipterists, such as Drs. Frey, Gruenberg, and others, regard the labella of Diptera as modified labial palpi, and Frey, 1921, cites among others, as favoring this view, the works of Burmeister, 1832, Erichson, 1840, Becher, 1882, Kraepelin, 1884, Gruenberg, 1907, and Frey, 1913. Furthermore, all of the modern American Dipterists whom I have questioned in the matter, such as Drs. J. M. Aldrich, C. P. Alexander, and others whose intensive studies of the Diptera have qualified them to express an opinion on the subject, have expressed their unqualified approval of the interpretation of the labella of Diptera as modified labial palpi, so that Dr. MacGillivray is greatly mistaken in thinking that Dr. Tillyard and I are the only recent investigators who regard the labella as modified labial palpi. The correctness of any view, however, is not determined by the number of its adherents, and the "*petitio ad auctoritatem*" can never carry more weight than a direct appeal to the evidence offered by the structures themselves, in the mind of any one imbued with the modern spirit of research. I would therefore rest my case upon the evidence obtained from the actual study of the insects themselves, and I would cite the following facts as offering conclusive proof that the labella of the Diptera are not paraglossae, but are modified labial palpi.

In the Dipteran shown in Fig. 7, the labial palpi *lp* are distinctly two-segmented, and the same is true of the Dipteran shown in Fig. 4. In no Holometabolous insects whatsoever are

the paraglossae ever two-segmented. The structures in question in the Diptera must therefore be modified labial palpi, rather than paraglossae.

In the Dipteran shown in Fig. 12 the structures labelled *lp* must be labial palpi because they are borne on the distal ends of the palpigers *pgr*. Neither paraglossae nor any other labial structures (save the palpi alone) of any insects whatsoever are ever borne on the distal ends of the palpigers. The labial palpi *lp* of the Diptera shown in Figs. 12, 7, 20, etc., must therefore be labial palpi and nothing else.

Dr. MacGillivray apparently realized that it would be fatal to his argument to interpret the structures labelled *pgr* as the palpigers in the Dipteran shown in Fig. 12, and he consequently interprets them as labial stipites instead. The muscles labelled *mus* in the Dipteran shown in Fig. 12, however, are exactly homologous with similar muscles extending from the palpigers to the region of the gular pits, or posterior tentorial invaginations, in such insects as *Corydalis* (see Crampton, 1921), etc., and since these same muscles, which extend from the posterior tentorial invaginations to the palpigers, are attached to the structures labelled *pgr* in the Dipteran shown in Fig. 12, the structures labelled *pgr* can be nothing else than the palpigers—and the structures labelled *lp* which they bear at their distal ends, must be the labial palpi.

Dr. MacGillivray stoutly defends his student, Otones, in maintaining that the structures labelled *pgr* in the Mecopteran shown in Fig. 13 are not the palpigers either; but if one studies carefully the series of insects shown in Figs. 10, 11, 12 and 13, the correctness of the homologies there indicated will be at once apparent. Let us start, for example, with the insect shown in Fig. 10, in which the interpretation of the parts are essentially the same as the interpretation given for this insect by Dr. MacGillivray, since it is only by starting at some point upon which we all agree, that we can have any common basis for argument.

Dr. MacGillivray admits that the structures labelled *pgr* in Fig. 10 are the palpigers which bear at their distal ends the labial palpi *lp*. The median region *ls* he regards as the united labial stipites, and he interprets the lateral membranous lobes *pgl* of the ligula *lg*, as the paraglossae. In all of these interpretations I would agree with Dr. MacGillivray.

In the insect shown in Fig. 10 there is a marked tendency for the palpigers *pgr* (which bear the labial palpi *lp* at their distal ends after the fashion of the palpigers of all insects without exception) to become approximated mesally, and to crowd forward (or dorsalward) out of position the labial stipites *ls* and ligula *lg*, upon which the approximated palpigers *pgr* now come to lie. A further stage of evolutionary modification is

illustrated by another Coleopteran shown in Fig. 11, in which the ligula *lg* of Fig. 10 (composed of the paraglossae *pgl*) becomes reduced to the tiny vestige labelled *lg* in Fig. 11, while the palpigers *pgr*, which become approximated over the median labial stipites *ls* and ligula *lg* (composed of the paraglossae *pgl*) in Fig. 10, now become closely applied to each other mesally to form the palpigers *pgr* of Fig. 11. These palpigers *pgr* in Fig. 11 unite so closely that they are separated only by a median suture, while the labial stipites region *ls* of Fig. 10, which is situated at the base of the ligula *lg* in Fig. 10, now becomes so crowded out and reduced that there are scarcely any traces of it retained on the anterior (dorsal) surface, while no traces of it are visible on the posterior (ventral) surface; and only the tip of the disappearing ligula *lg* (composed of the paraglossae) is to be seen between the bases of the labial palpi *lp*, which are borne, as usual, at the distal ends of the palpigers *pgr*. A few strands of what appeared to be vestigial muscle threads *mus* remained attached to the bases of the palpigers *pgr* in the specimen shown in Fig. 11, but the labium is so greatly reduced in *Calopteron*, that the muscle, also, has practically or wholly disappeared in normal specimens.

It is a simple matter to compare the parts of Fig. 12 with those of Fig. 11, since the palpigers *pgr* of Fig. 12 bear the palpi *lp* at their distal ends, as in Fig. 11, and the tiny ligula *lg* of Fig. 12 (which is hardly visible from this aspect of the labium) composed of the paraglossae, as in Fig. 11 (or Fig. 10), is even more reduced in size than is the vestigial ligula *lg* of Fig. 11. It is but a step from the condition exhibited in Fig. 12 to that exhibited by the insect shown in Fig. 13, since in the latter insect the ligula *lg*, which was already "on the road to extinction" in Figs. 12 and 11, now becomes completely lost in Fig. 13. The labial palpi *lp* of Fig. 13 are borne at the distal ends of the palpigers *pgr* in the usual fashion, in Fig. 13, and to the proximal or basal ends of these palpigers *pgr* of Fig. 13 are attached the typical palpigeral tendons *pgt*, which correspond to the palpigeral tendons *pgt* attached to the bases of the palpigers *pgr* of the insect shown in Fig. 10 and these tendons serve as points of attachment for muscles extending to the gular region in both insects. It is thus perfectly clear that the palpigers *pgr* of Fig. 13 are the palpigers *pgr* of Fig. 12, and these in turn are the palpigers *pgr* of Figs. 11 and 10; while the labial palpi *lp* are borne on the distal ends of the palpigers *pgr* in the fashion typical of all insects, in all of the forms shown in the series traced from the insect shown in Fig. 13 back to Fig. 10, from which we started.

A study of the structural details of the insects shown in the series illustrated by Figs. 10, 11, 12 and 13, would thus completely confirm the conclusions as to the interpretation of the

parts in the series from Fig. 1 to Figs. 3 and 4. A further comparison of such Diptera as the one shown in Fig. 20 with such Mecoptera as the ones shown in Figs. 19 and 18 would indicate that while in some Diptera and Mecoptera the mentum *mn* is greatly elongated as in Figs. 3 and 2, in other Diptera and Mecoptera such as those shown in Figs. 20 and 19, the mentum *mn* is not elongated, but in both of the latter types the mentum *mn* has remained rather short and has retained the median process labelled *mm* in Figs. 20 and 19. It is thus quite evident that the same evolutionary tendencies occur in both Diptera and Mecoptera, and we are absolutely justified in assuming that the labial palpi *lp* of the Dipteran shown in Fig. 20 represent the labial palpi *lp* of the Mecopteran shown in Fig. 19, while the palpigers *pgr* of Fig. 20 represent the palpigers *pgr* of Fig. 19, and the mentum *mn* is practically the same in both. The correspondence even to the minutest details is thus most striking when we compare Figs 20 and 19, while the correspondence in the minutest details is equally apparent in the series of insects shown in Figs. 10 to 13, and the same close resemblance, part for part, is likewise exhibited in the series of insects shown in Figs. 1, 2 and 3. Dr. MacGillivray is therefore wholly unjustified in accusing me of confusing mere superficial resemblance, or analogy, with true homology, which is based upon fundamental resemblances in structural details, resulting from consanguinity, when he says that I have so confused analogy and homology in comparing the parts of the Dipterous labium with those of the Mecopterous labium in series 1 to 3, for example. There is no mere superficial resemblance here, and it is unfortunate that Dr. MacGillivray did not extend his studies to include all of the available facts, in attempting to determine this matter.

Every student of phylogeny is keenly alive to the importance of studying the tendencies exhibited by the nearest ancestral types, in attempting to determine the modificational tendencies exhibited by a group higher in the scale of evolution. It is therefore imperative that we study the condition exhibited by the Mecoptera (which are admitted by all to be the nearest living representatives of the types ancestral to the Diptera) in attempting to determine the correct interpretation of the parts of the Dipterous labium, and such a study of the Mecoptera indicates in no uncertain manner, that the two-segmented labial palpi, approximated palpigers, and a mentum, are what we would expect to find in the Diptera. There is no indication whatsoever in the Mecoptera (which are like the ancestors of the Diptera) that the paraglossae are ever retained at all—much less that they shall become enormously developed, nor is there any indication in the Mecoptera that the labial palpi shall completely disappear. In fact, the distal segments of the

labial palpi of certain Mecoptera, such as the one shown in Fig. 22, may even become membranous, labella-like lobes exactly like the labella of the Diptera, thus indicating unmistakably the tendencies which later find opportunity for further development in the Dipterous labium. Dr. Tillyard informs me that the labial palpi of some Mecoptera actually exhibit pseudotracheae similar to the pseudotracheae occurring on the labella of certain Diptera, and it is absurd to brush aside as of no value such important features in the labium of the Mecoptera, which are of the utmost importance for a correct understanding of the modifications undergone by the Dipterous labium.

Not only should we study the Mecoptera, in attempting to reach a correct decision as to the meaning of the parts of the labium of the Diptera, but it is also necessary to study the modificational tendencies exhibited by other Holometabola closely related to the Diptera. The closest relatives of the Diptera, other than the Mecoptera, are the fleas, Trichoptera and Lepidoptera, and in all of these orders (as in the Mecoptera also) the ligula, composed of the paraglossae, is completely lost, while the palpigers, bearing the labial palpi, become mesally approximated and compose the distal portions of the labium. It is thus but natural to expect that the Diptera shall exhibit the same evolutionary tendencies which are manifested by *all of their relatives*, and such a supposition inevitably leads to the conclusion that the labial palpi, palpigers and mentum are the structures which make up the Dipterous labium.

Thus, in the Trichopteran shown in Fig. 14, the ligula, composed of the paraglossae has completely disappeared (the median structures labelled *hph* in Fig. 14 is the hypopharynx, as is indicated by the opening of the salivary duct at its base) while the palpigers *pgr*, which bear the labial palpi *lp*, become approximated mesally and the mentum *mn* has a median prolongation *mm* similar to that of the mentum of the Dipteran shown in Fig. 20. It is therefore not the paraglossae which are retained in the Trichoptera, but rather the labial palpi, and the inference is that the same occurs in the related Diptera.

Similarly, in the Lepidopteran shown in Fig. 15, the ligula, composed of the paraglossae, is lost (the median structure *hph* is the hypopharynx, as in the Trichopteran shown in Fig. 14), while the palpigers *pgr* become approximated mesally, and bear the two-segmented labial palpi just as in the Diptera, although the palpigers *pgr* of the Lepidopteran shown in Fig. 15 bear a pair of lobes labelled *lo*, which are not present in the Diptera here figured. It is therefore not the paraglossae which are retained in the Lepidoptera, but rather the labial palpi, and the inference is that the same occurs in the related Diptera.

The Lepidopteran shown in Fig. 15 is remarkably similar to the Trichopteran shown in Fig. 14, and the labium is thus in

line with other structures indicating an extremely close relationship between the Lepidoptera and Trichoptera. The labium of the Trichopteran shown in Fig. 14 is more primitive than that of the Lepidopteran shown in Fig. 15 in that the labial palpi *lp* of the Trichopteran are three-segmented, while the palpi of the Lepidopteran are reduced to two segments. There is a well developed submentum *sm* in *Sabatinca* (Fig. 15) as in *Micropteryx* and related genera.

In the fleas (Fig. 8), which are very closely related to the Diptera, and are thought to be descended from the Diptera by some investigators, the ligula is apparently completely lost, as in other higher Holometabola, and the labial palpi *lp* (Fig. 8) become approximated to form the terminal portion of the labium. The greater portion of the labium of the fleas is made up of the labial palpi *lp*, the palpigers *pgr*, and the mentum *mn*, as in the Diptera and other higher Holometabola, although a distinct submentum *sm* is retained in the flea shown in Fig. 8.

It is surely worthy of consideration, in determining the homologies of the parts of the Dipterous labium, that in *all* of the higher Holometabola (i. e. the Mecoptera, Siphonaptera, Trichoptera, and Lepidoptera) *the paraglossae are always lost*, while the labial palpi are always retained, being approximated to form the terminal portion of the labium in all higher Holometabola; and it is folly to disregard the tendencies exhibited by all of the related groups of insects, and by the "ancestral" group of the Mecoptera as well, in attempting to determine the correct interpretation of the parts of the labium in the Diptera! We simply can not ignore these important facts, and when the evidence from this source is in full accord with that gained from a detailed comparison of the parts of the Dipterous labium with those of related forms, it is quite apparent that the view that the labella of Diptera represent the modified labial palpi is the only one worthy of consideration, since it is the only one for which any actual proof has been adduced, and is the only one in harmony with all of the known facts.

It may be remarked in this connection that it is not merely in the higher Holometabola alone (i. e. the Siphonaptera, Diptera, Mecoptera, Trichoptera and Lepidoptera) that the ligula becomes atrophied and the labial palpi become approximated to form the terminal portion of the labium, for similar tendencies are exhibited in all of the Holometabolous orders (with the exception of the Strepsiptera, in which the labium is practically entirely lost). Thus in the Coleopterous series represented by Figs. 27, 28 and 29, there is apparent a tendency for the palpigers *pgr* to become approximated, and for the ligula *lg* to become reduced—a process which is carried still further in the Coleopteran shown in Figs. 11 or 21, and in the Coleopteran shown in Fig. 16 the ligula is apparently completely lost. Simi-

larly, in the Hymenopterous series represented by Figs. 32, 33 and 34, there is evidently a tendency for the palpigers *pgr* to become approximated mesally, while the ligula, or glossae and paraglossae, become crowded out of position and are pushed forward in a peculiar fashion. So too, in the Neuropterous series shown in Figs. 23, 24 and 25, it is clearly apparent that there is a well marked tendency for the palpigers *pgr* with the palpi *lp* to become approximated mesally, and to crowd out the ligula *lg* which is again pushed forward out of the way, and this well marked tendency for the palpigers to become approximated mesally and to crowd the ligula out of place in these lower Holometabola, clearly paves the way for the further development of similar tendencies in the higher Holometabola, in which there is not only a tendency for the palpigers to become approximated mesally, but the crowded-out ligula seems to disappear completely in the higher Holometabola, with the possible exception of the Diptera in which the ligula practically disappears, being scarcely visible in most Diptera. In fact, I do not really believe that the so-called ligula of the Diptera represents the retention of a true ligula, since I consider that it is a new formation composed of the union of two small lobes of the palpi, such as those shown in Fig. 5; but since the tendency among recent investigators is to regard the median structure between the labial palpi of Diptera as a true ligula, I have provisionally followed this usage in the present paper.

The greater portion of the foregoing discussion has been devoted to the establishing of the homologies of the palpigers and labial palpi in the Diptera and related forms, since the settling of this question is the most important feature in determining the homologies of the parts of the Dipterous labium, and I trust that I have made it clear that the labial palpi and palpigers can not possibly be regarded as the paraglossae and labial stipites, as is claimed by Dr. MacGillivray, nor can the palpigers (which are called the "theca" by Peterson, 1916), be regarded as part of the mentum, as Frey, 1921, apparently thinks is the case. There is a true mentum labelled *mn* in the Dipteran shown in Fig. 20, and this mentum corresponds in every way with the mentum *mn* of the Mecopteran shown in Fig. 19. The mentum *mn* of both Figs. 20 and 19 bears the typical median process labelled *mm* in these figures, and this process is just like the median process *mm* borne on the mentum of the Trichopteran shown in Fig. 14, or of the Lepidopteran shown in Fig. 15, or of the Coleopteran shown in Fig. 16, or of the Hymenopteran shown in Fig. 33, etc., and this median process, which extends up between the palpigers *pgr* in some cases, is typical of the mentum of many insects and is of value in identifying the mentum.

Dr. MacGillivray would interpret the mentum *mn* of such a Mecopteran as the one shown in Fig. 19, as the "submentum," instead of regarding it as the mentum. In the Mecopteran shown in Fig. 22, however, there is a distinct submentum and gular region labelled *sm* and *gu* behind the mental region *mn* (the submentum and gula are united and continuous in practically all insects), so that the plate *mn* of the Mecoptera shown in Figs. 22, 19, etc., can hardly represent the submentum. In fact, the submentum is never located immediately basal to the palpigers, for the mentum *mn* always occupies this position when both mentum and submentum are present as in Fig. 16 (or Fig. 21), and the submentum never has a median process *mm* extending forward to the palpigers *pgr* as is the case with the plate labelled *mn* in Figs. 20, 19, 14, 15, 16, 17, 33, etc., which is therefore the mentum in all of these figures.

The submentum *sm* is fairly large in the primitive Hymenopteran shown in Fig. 32, and the mentum *mn* is not proportionately very large in this insect.¹ In the Hymenopteran shown in Fig. 33, however, the mentum *mn* increases in length, while the submentum *sm* becomes more elongated and proportionately smaller and the process is repeated until in such Hymenoptera as the one shown in Fig. 34, the mentum *mn* has become very greatly elongated, and the submentum *sm* has become reduced to the small triangular area shown in Fig. 34.

A similar tendency toward the reduction of the submentum *sm* and the elongation of the mentum *mn* is shown in the series of insects depicted in Figs. 27, 28 and 29. Since Dr. MacGillivray would contest this interpretation of the mentum and submentum in the Coleoptera, I would start with the condition exhibited by the labium of the insect he calls "*Blatta*" (i. e. *Periplaneta*) *orientalis*, shown in Fig. 26, and compare it with the labia of the Coleoptera as he has done. It is necessary, however, to use a more primitive type of Coleopteran for comparison with the Blattid than Dr. MacGillivray used, if the comparison is to be of any value; and when the labium of such a

¹In my figures of the labia of Hymenoptera I have followed the interpretation of MacGillivray, who regards the apparent basal segment of the labial palpi (i. e. the structure labelled *pgr* in Figs. 32 and 34) as the homologue of the palpigers. In his Figure 14 of the labium of the current sawfly, Snodgrass, 1925 ("Anatomy of the Honeybee") interprets as the united palpigers the sclerite I have labelled *mn* in the sawfly shown in Fig. 32, for example, and I think that Snodgrass' interpretation is the more probable one, since I find attached to the plate *mn*, in certain sawflies, muscles similar to those which extend between the palpigers and gular region in other insects. It would therefore appear that the palpigers are included in the region labelled *mn* in Fig. 32, for example, and the segment bearing the label *pgr* is really a segment of the labial palpus in Hymenoptera. It was impossible to change the labelling of the plates, however, since the blocks for these have already been made, and this correction will have to serve, in referring to the parts shown in the Hymenopterous figures.

primitive Coleopteran as that shown in Fig. 27 is compared with the labium of the Blattid shown in Fig. 26, it is at once apparent that the large area labelled *sm* in the Coleopteran shown in Fig. 27 corresponds to the submentum *sm* of the roach shown in Fig. 26, while the chitinized mentum labelled *mn* in Fig. 27 corresponds to the chitinized mentum *mn* of Fig. 26, and the mental membrane *mem* of Fig. 27 corresponds in every way to the mental membrane *mem* of Fig. 26. Distal to the mental membrane *mem* in both insects are the palpigers *pgr* bearing the labial palpi at their distal ends, while the ligula *lg* is situated between and distal to the palpigers in both insects. It is thus a very simple matter to compare all of the parts in both insects, since they correspond in every way, save that the Coleopteran has no glossae, and the roach has no differentiated gular region.

Having determined the homologies of the parts of the labium of the Coleopteran shown in Fig. 27, it is a simple matter to compare its parts with those of the labium of the Coleopteran shown in Fig. 28. Thus, the gular region *gu* of Fig. 27 corresponds to the gular region *gu* of Fig. 28, while the large submentum *sm* of Fig. 27 becomes the reduced submentum *sm* of Fig. 28. The chitinized mentum *mn* and mental membrane *mem* of Fig. 27 become enlarged to form the chitinized mentum *mn* and mental membrane *mem* of Fig. 28. The palpigers *pgr* of Fig. 27 become more elongated in Fig. 28, and the ligula *lg* becomes narrower and more markedly crowded forward in Fig. 28. In the Coleopteran shown in Fig. 29 the processes operative in Fig. 28 become even more marked. The submentum *sm* becomes even more greatly reduced in Fig. 29, while the mentum *mn* becomes proportionately much larger¹ and is more elongated in Fig. 29. The palpigers *pgr* are more closely approximated in Fig. 29, and the ligula *lg* becomes slenderer and more markedly crowded out of place.

Thus in the Coleopteran series shown in Figs. 27, 28 and 29, as in the Hymenopteran series shown in Figs. 32, 33 and 34, the submentum *sm* tends to become reduced to a mere vestige, while the mentum *mn* becomes greatly elongated, ending in the extremes of modifications exhibited by the insects shown in Figs. 29 and 34. These series represent very definite tendencies in the groups in question, and serve to indicate what evolutionary tendencies may be looked for among certain higher Holometabola.

¹An examination of a series of Lampyroid and other Coleoptera from South America has convinced me that the elongated region in question is composed chiefly of the mentum; and it is very probable that the slender elongated region labelled *mn* in the insects shown in Figs. 1, 2, 3, etc., is likewise composed chiefly of the mentum. The submentum has either become membranous, or has united with the sclerite bearing the label *mn*, in Figs. 1, 2, 3, etc.

In the Coleopteran shown in Fig. 9, the palpigers *pgr* tend to unite with the greatly elongated mentum *mm*, and in the Dipteran shown in Fig. 4 it would appear that the palpigers *pgr* likewise tend to unite with the greatly elongated mentum *mm*, while the submentum has apparently become membrabous, or is lost, in both insects. In the flea shown in Fig. 8 the palpigers *pgr* likewise show some indications of a tendency to unite with the mentum *mm* (although a suture still demarks the two regions in question); but the submentum *sm* has not yet become membranous, although it is greatly reduced, and is apparently "on the way" to become atrophied.

The tendencies exhibited by these insects help us to understand the condition exhibited by the labia of the insects shown in Figs. 3, 2 and 1, for in the latter series the submentum is apparently lost through becoming membrabous, while the mentum *mm* becomes greatly elongated to form the long columnar region labelled *mm* in Figs. 1, 2 and 3. A comparison of the Mecopteran shown in Fig. 2, with the Mecopteran shown in Fig. 19, would indicate that the elongated sclerite *mm* of Fig. 2 is the mentum *mm* alone of Fig. 19, for the submentum *sm* of the Mecopteran shown in Fig. 22 is apparently not represented in either Fig. 19 or Fig. 2, but merely remains membrabous in the Mecoptera there figured. It is also very probable that the elongated columnar sclerite labelled *mm* in the Neuropteran shown in Fig. 1 represents the mentum alone, rather than the mentum and submentum united, as I formerly thought to be the case.

With regard to the interpretation of the parts of the Neuropterous labium shown in Fig. 25 or Fig. 1, Dr. MacGillivray criticises me for interpreting the structures labelled *pgr* as the palpigers in Fig. 25, because he thinks that the structures *pgr* of Fig. 25 are really the labial stipites, and that it would be impossible for the palpigers to become approximated and intervene between the ligula *lg* and the mentum, becoming fused together in the process, and thereby suppressing the parts normally situated between the palpigers. Exactly this condition, however, has occurred in the labium of the Coleopteran shown in Fig. 21 or Fig. 11 in which a comparison with other members of the same order of insects, such as the insect shown in Fig. 29 (compare also Fig. 11 with Fig. 10) clearly demonstrates that the palpigers *pgr* of Fig. 21 have approached one another and have united mesally (so closely have they united that it would necessitate rupturing the chitin to separate them forcibly) while the labial stipites region *ls* (which intervened between the palpigers *pgr* in such insects as the one shown in Fig. 28, or Fig. 10) in Fig. 21 becomes completely suppressed on the surface there shown, so that the palpigers *pgr* intervene completely between the ligula *lg* and the mentum *mm* in an

unmistakable fashion. It is therefore unfortunate that Dr. MacGillivray could not have studied the common insect shown in Fig. 21 and compared it with other Coleoptera, or he would readily have seen how "that the palpigers could become fused to the surface of a sclerite, the prementum (he means the labial stipites) and suppress it, so that the palpigers would become the connecting sclerite between the mentum and ligula, to use Dr. Crampton's nomenclature"—a process which Dr. MacGillivray deemed impossible in any insect, and hence denied its possibility in the insect shown in Fig. 25 as well. If the seemingly impossible could occur in the insect shown in Fig. 21, I do not see why it could not also occur in the insect shown in Fig. 25; and, just as a comparison of the Coleopteran shown in Fig. 21 with other Coleoptera (such as those shown in Fig. 29 and 28, or in Figs. 11 and 10) clearly demonstrates that the palpigers *pgr* can and do intervene between the ligula *lg* and the mentum *mn* in the same way, a comparison of the Neuropteran shown in Fig. 25 with the other Neuroptera shown in Figs. 24 and 23 clearly demonstrates that the palpigers *pgr* can and do intervene between the ligula *lg* and the mentum *mn* in the Neuropteran shown in Fig. 25, despite Dr. MacGillivray's unsupported denial that such a condition could exist in the insect shown in Fig. 25; and the palpigers *pgr* of Fig. 25 are clearly the palpigers and are not the labial stipites as Dr. MacGillivray claims they are in this insect! A comparison with other insects (compare Fig. 25 with Figs. 24 and 23, or compare Fig. 25—or the same insect shown in Fig. 1—with Fig. 21) thus demonstrates that the interpretation given in Fig. 25 or Fig. 1 is entirely correct; and starting with Fig. 1, the interpretations given in the series from Fig. 1 to Fig. 3 and Fig. 4 are entirely justified by a detailed study of the parts.

Since a detailed study of the parts, and a comparison with other insects indicate that the interpretations given in the series from Fig. 1 to Fig. 4 are correct, Dr. MacGillivray's charge that in this series I have mistaken a mere superficial resemblance, or a mere "analogy in form," for true homology, is utterly without basis—and I may add that twenty years spent in an intensive study of comparative morphology have enabled me to distinguish between a mere superficial resemblance in outline, and true homology. "*De mortuis nihil nisi bonum*" is an expression "worthy of all acceptance," but the living are worthy of some consideration also and in the interest of the furtherance of the cause scientific truth and accuracy, such views as are in full accord with all of the known facts can not be lightly brushed aside as unwarranted assumptions unworthy of further consideration; and if students are to be taught that the labella of Diptera represent "paraglossae," they should at least be informed that there is another possible view as to the homologies of these structures!

In discussing the interpretations of the parts of the labium, Dr. MacGillivray has made two statements which will create confusion unless corrected. His statement that I applied the term prementum to the sclerites which Yuasa, 1920, had already termed "stipulae" is wholly mistaken. The structures which Yuasa refers to as "stipulae" (a term denoting "pin-feathers") are those which I have always called labial stipites (or labiostipites—i. e. *ls* of Fig. 26) following the usage of Dr. A. Boving, and the earlier Coleopterists, who refer to the structures in question as the labial stipites or "stipites labii" in Coleopterous larvae. As every student of Ornithology knows, in general zoological usage the term "stipulae" refers to "pin-feathers," and since the labial stipites of insects have nothing to do with "pin-feathers," I prefer to retain for them the older and more appropriate designation of labial stipites, or the single term labiostipites. Since I have always referred to these structures as the labial stipites (or labiostipites), it is obvious that I can not have called them the "prementum" as Dr. MacGillivray states. I have always used the term prementum to designate an area anterior to the mentum, and composed largely of the palpigers (i. e. the region labelled *pm* in Figs. 1 to 3, Figs. 5 to 8, Figs. 18 to 21, Fig. 30, etc.) with which the labial stipites may unite, and the ligula may also fuse as in Fig. 30. The prementum is thus clearly very different from the labial stipites alone (i. e. Yuasa's "stipulae"), and the term prementum is in no sense synonymous with Yuasa's term "stipulae," as Dr. MacGillivray mistakenly considers to be the case.

The area labelled *pm* in the Mecoptera shown in Figs. 13, 2, 18, 19, etc., which is homologous with the prementum of other insects (i. e. *pm* of Figs. 20, 21, etc.) is termed the "mecaglossa" by Otnes, 1922, who mistakenly considers that this "mecaglossa" is peculiar to the Mecoptera alone, and in this view he is upheld by Dr. MacGillivray. Aside from that fact that the designation "mecaglossa," meaning "long glossa," is singularly inappropriate for a structure which has nothing to do with the glossa, and in insects which have completely lost the glossa through atrophy, as is the case with the Mecoptera (which are supposed to be the only insects having a "mecaglossa"), it is entirely incorrect to refer to the prementum of the Mecoptera as a "mecaglossa" on the ground that it is not homologous with the prementum of other insects. If one will run through the series of insects shown in Figs. 13, 12, 11, and 10, it should be quite apparent that the prementum *pm* of the Mecopteran shown in Fig. 13, is homologous with the prementum *pm* of the Dipteran shown in Fig. 12 (compare also *pm* of Fig. 19 with Fig. 20) or the Coleoptera shown in Figs. 11 and 10, and there is no just reason for terming the region in question the "mecaglossa" in Mecoptera alone, ignoring its

homologue in other insects, unless exactly the same structure is to have a different name in each order of insects, which is absurd. In the Mecopteran shown in Fig. 13, the prementum *pm* is composed almost entirely of the enlarged and elongated palpigers *pgr*, as is also true of the Dipteran shown in Fig. 12, and the Coleopteran shown in Fig. 11, although in the Coleopteran shown in Fig. 11, the ligula *lg* is retained, while it is lost in the Mecoptera—but in some Coleoptera also, the ligula likewise disappears, and leaves a prementum composed almost entirely of the palpigers, as in the Mecoptera. Since the Mecopteran type of prementum is thus not confined exclusively to the Mecoptera, and since the glossa is entirely lost in these insects, I prefer to retain for the structure in question the designation prementum instead of the later unnecessary, and wholly inappropriate substitute term "mecaglossa," implying a long glossa in insects which have no glossa at all.

Dr. MacGillivray accuses me of unjustly criticising his student Otnes for not figuring a supposed cleft between the palpigers of the labium of the Mecopteran "*Panorpodes*," and he states that he "mistrusts that Dr. Crampton and Mr. Otnes are not writing about the same cleft," since there is no such cleft in "*Panorpodes*." The truth of the matter is that I did not mention *Panorpodes* at all, and I fail to see what *Panorpodes* has to do with the discussion, or why it was brought in by Dr. MacGillivray. It was an entirely different insect, namely, *Panorpa lugubris*, and not "*Panorpodes*," which I said had a distinct cleft between the distal portions of the palpigers (see the palpigers *pgr* of this insect shown in Figs. 13 and 19). Otnes claimed to have "examined numerous specimens of *Panorpa lugubris*" without being able to find the well-defined sutures demarking the basal portions of the palpigers *pgr* of Figs. 13 and 19 (compare also Fig. 18), and it was this unaccountable inability to see these perfectly obvious sutures in *Panorpa lugubris* (shown in Figs. 13, 19, etc.) that I criticized in Mr. Otnes. No mention whatsoever was made of *Panorpodes* by me, as may be seen by referring to page 174 of Vol. 25 of these "Proceedings," and since I have never stated or implied that "*Panorpodes*" had such a suture or cleft, I am utterly at a loss to understand why Dr. MacGillivray accuses me of so doing, or why he brings in the wholly extraneous subject of *Panorpodes*' labium, and ignores the fact that I referred distinctly and specifically to *Panorpa lugubris*, not to "*Panorpodes*."

But one other criticism of Dr. MacGillivray's remains yet to be answered, namely, that I chose the "tips of lines of evolution" to illustrate the steps or stages in the process of evolving the elongated Dipterous type of labium. While I did not restrict the discussion to the most highly modified members alone

in each of the insectan orders, as Dr. MacGillivray would imply, I did, however, arrange a series of elongated labia chosen from successively higher Holometabolous orders, arranged in an ascending series of modificational stages to illustrate the probable steps through which the precursors of the Dipterous type of labium may have passed, in the derivation of this type of labium from successively more primitive or less modified types. There was no implication that any member of the progressive series was ancestral to any other member of the series, since the insects figured were all recent, *living* forms, and it should be obvious to any one that contemporaries can not be actually ancestral to each other. On the other hand, some living insects have not travelled so far as others have along certain paths of development which they all are apparently following, and these, remaining virtually stationary at different levels of development, serve as "mile stones" to mark the stages through which those forms which have "forged ahead" have passed, in assuming their advanced condition. This is a well known and recognized phenomenon throughout the world of living things, and should furnish no cause for surprise or criticism, since it is familiar to every student of evolution. It is but natural that the modificational tendencies exhibited by a "higher" or "derived" group of insects shall be foreshadowed in some of the members of a closely related more primitive or "ancestral" group. One is therefore perfectly justified in comparing the elongated Dipterous type of labium, for example, with the similarly modified elongated type of labium exhibited by the members of the closely related "ancestral" order Mecoptera, and so on down the evolutionary scale, and it is only by comparing the parts of the labium of a modified type with a *similarly modified* labium of a closely related, but slightly more primitive form, that we can hope to reach a correct conclusion concerning the homologies of the parts, and the method by which the higher types have come to assume their present form. Furthermore, it was far preferable to choose *actual cases*, rather than purely hypothetical ones, to illustrate the successive evolutionary stages in the production of the Dipterous type of labium, since what nature has done, at least shows what nature is able to do, and this method of procedure has enabled me to avoid the pitfall of assuming for the Diptera a condition of affairs wholly unknown in any insects whatsoever, and wholly at variance with all of the modificational tendencies of all of their allies—namely, that the paraglossae shall become segmented and enormously developed, while the labial palpi become completely suppressed.

In searching for certain definite landmarks demarking the limits of the various areas of the labium, I have been greatly disappointed that some features which gave promise of being

of value, seemed to fail in some cases, and therefore could not be used as trustworthy criteria in all instances. Thus, the attachment of the basimaxillary membrane, or the membrane connecting the basal region of the maxilla with the labium, might be used in some cases in determining the distal limits of the mentum. Similarly, the points of articulation of the maxillary condyles, or the location of the gular pits, might be taken to demark the posterior (proximal) limits of the submentum; but these landmarks are unsatisfactory in that they appear to shift their position in some insects, so that it has seemed preferable to use the comparative method of study in attempting to determine the limits of the various regions of the labium, and by using the primitive forms as the basis of comparison, one can quite readily determine the homologies of the parts in the more specialized forms if he be so fortunate as to obtain the intermediate stages connecting the lower with the higher types.

A study of the origin and insertion of the various labial muscles would be of the utmost value in such a study, and should afford a "last court of appeals" for determining disputed points. I must confess, however, that I have avoided the study of the musculature whenever possible, since the eye-strain involved is too great when one is dealing with the labia of insects which are so small that it is difficult to see the parts of the entire labium with the higher powers of the dissecting microscope. Furthermore, it is necessary to have material preserved in fluid in order that the muscles may be preserved for dissection, and in many instances it is impossible to obtain the desired material suitably preserved. A study of the musculature, however, has so frequently confirmed the conclusions reached from the comparison of the labia through a long series of intermediate forms connecting the higher with the more primitive types, that the latter method seems to be quite reliable, and in most instances has furnished the basis for the conclusions here set forth—though whenever feasible, the evidence of comparative morphology has been tested by a study of the musculature as well.

With regard to the interrelationships indicated by a study of the labia of Holometabolous insects, it may be mentioned that the division of the Holometabola into higher Holometabola (or "Panmecoptera"—i. e. the Siphonaptera, Diptera, Mecoptera, Trichoptera and Lepidoptera) and lower Holometabola (or "Panneuroptera"—i. e. Hymenoptera, Coleoptera, Strepsiptera and Neuroptera) on the basis of the evidence offered by other features of the body, receives confirmation through a study of the labium, in that the labia of the higher Holometabola tend to lose the ligula entirely, while the palpigera become approximated mesally, and the labial palpi form the terminal

portion of the labium in all of the higher Holometabola I have examined. In the lower Holometabola, on the other hand, there is a tendency to retain the ligula (though some lose it) and the palpigers become approximated less frequently, so that the retention of the ligula prevents the labial palpi from forming the terminal portion of the labium in most of the lower Holometabola. In this respect, the Neuroptera are more closely allied with the lower Holometabola than with the higher Holometabola; but the modifications of the labium exhibited by such Neuroptera as the one shown in Fig. 1 would indicate that there exist in the Neuropterous stem certain evolutionary tendencies which are characteristic of some higher Holometabola, such as the ones shown in Figs. 2 and 3; and while the Neuropteran shown in Fig. 1 is in no sense ancestral to the higher Holometabola shown in Figs. 2 and 3, it nevertheless shows that certain Neuroptera exhibit tendencies which find opportunity for fuller expression in the higher Holometabola and in a sense, the Neuroptera are intermediate between the higher and lower Holometabola.

Of the lower Holometabola, the Neuroptera and Coleoptera are very closely related, according to the evidence of the larval mouthparts, and a study of the labium of the adults would tend to support this view. The study of other parts of the body would indicate that the Coleoptera are also very closely related to the Hymenoptera, but, unfortunately, the Hymenopterous material which I have at my disposal does not present very marked resemblances between the two groups in so far as the labium of the adults is concerned. In the reduction of the submentum *sm* and the elongation of the mentum *mn*, however, the Hymenopterous and Coleopterous labia shown in Figs. 34 and 29 are quite similar, and the same modificational tendencies thus appear, to some extent, in both groups. The labium of the Strepsiptera is so greatly reduced that it offers no particular evidence of relationship to the Coleoptera, although the labium of certain Meloid Coleopterous larvae resembles that of the larval Strepsiptera quite closely.

A study of the labium of the higher Holometabola would indicate that the Trichoptera (Fig. 14) are very closely related to the Lepidoptera (Fig. 15), since in both the ligula disappears while the palpigers remain distinct and the labial palpi are usually quite well developed. The evidence of the labium is thus in accord with that drawn from other sources indicating a close relationship between the Lepidoptera and Trichoptera. The resemblances between the parts of the labium of the Diptera (Figs. 3 and 20) and the Mecoptera (Figs. 2, 19, etc.) are very striking and bear out the evidences of an extremely close relationship between the Diptera and Mecoptera indicated by other body structures as well. The labium of the flea shown

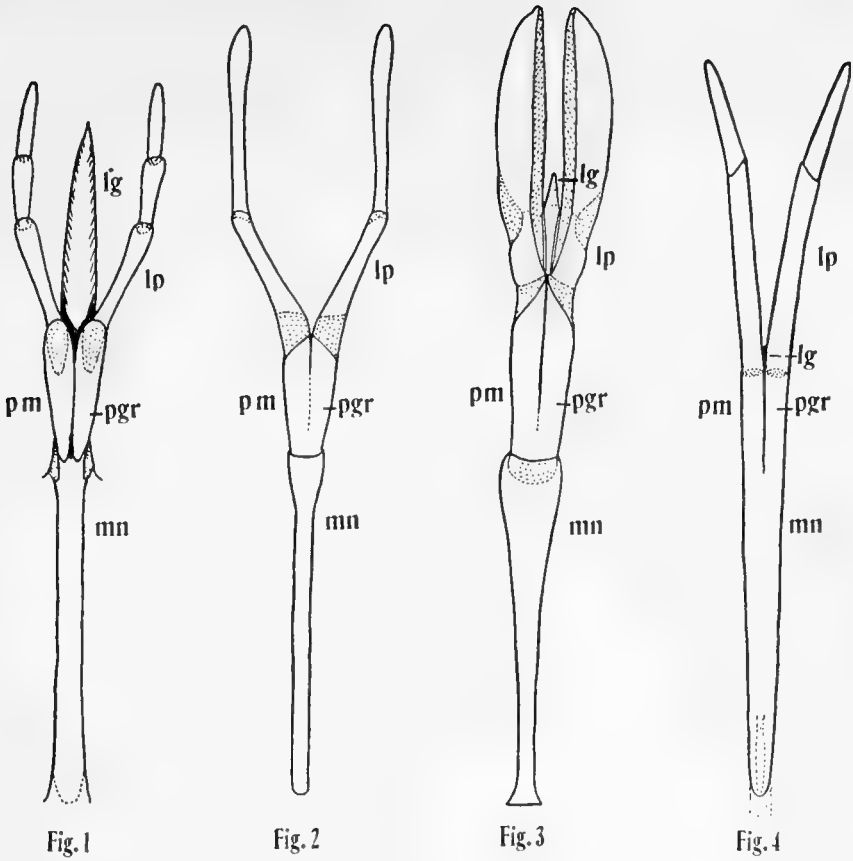


Fig. 1

Fig. 2

Fig. 3

Fig. 4

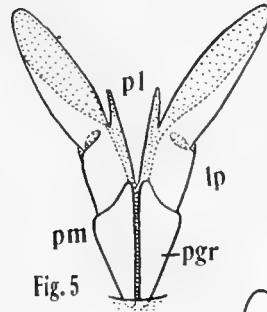


Fig. 5

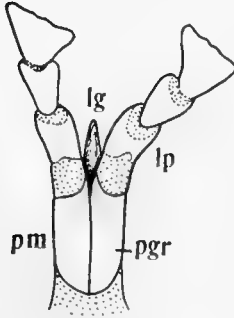


Fig. 6

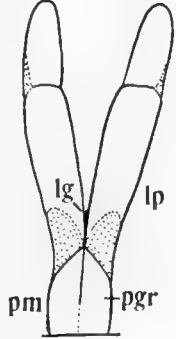


Fig. 7

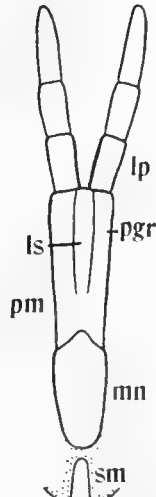


Fig. 8

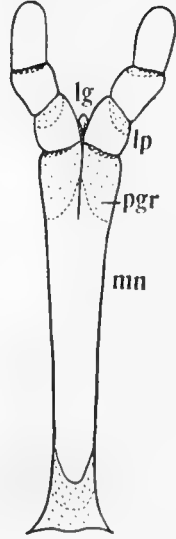
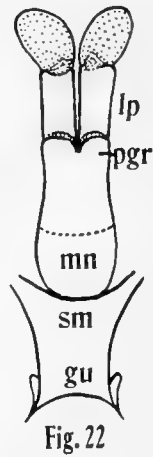
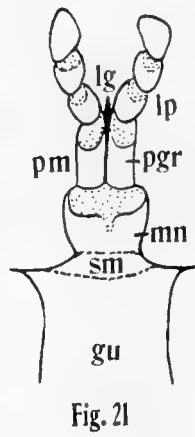
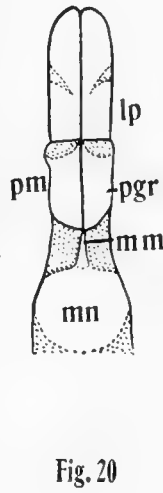
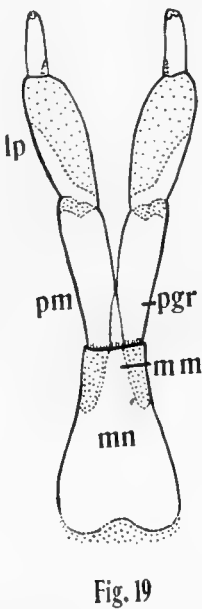
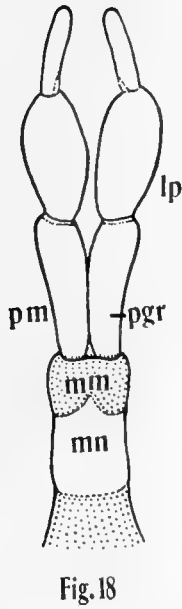
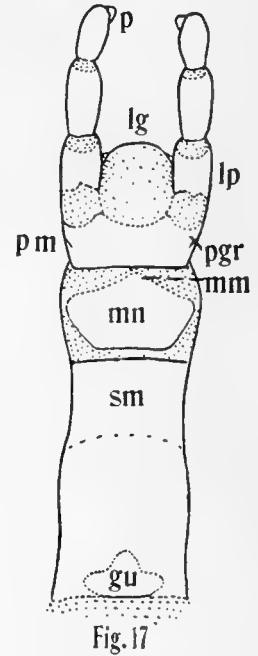
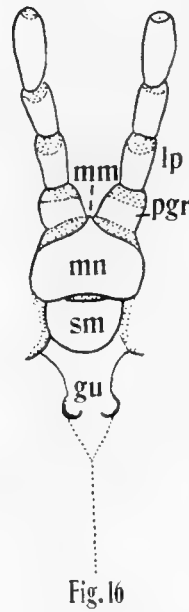
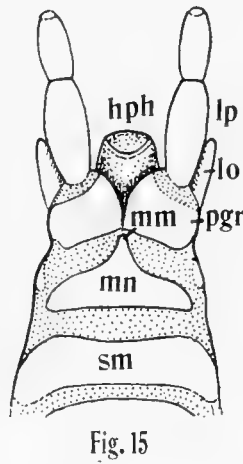
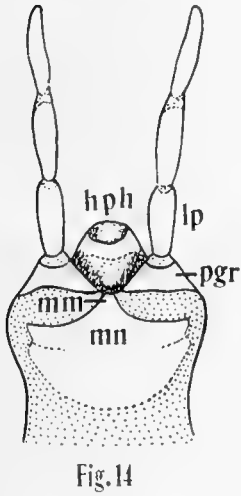
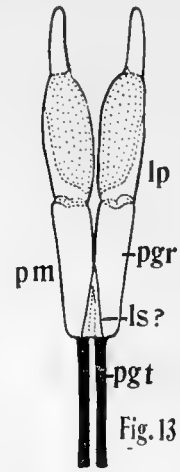
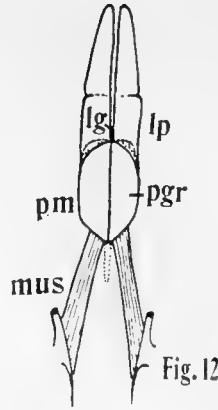
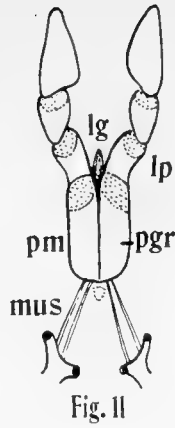
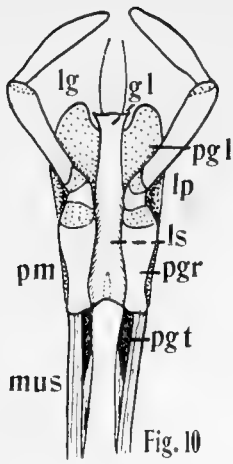


Fig. 9

CRAMPTON—LABIA OF HOLOMETABOLA.



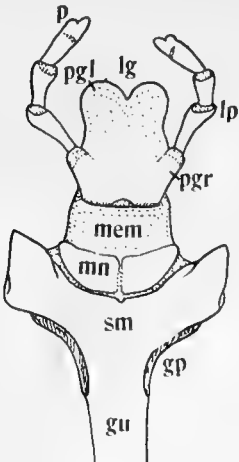


Fig. 23

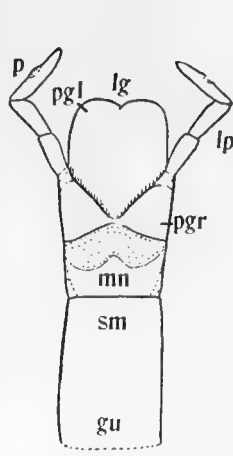


Fig. 24

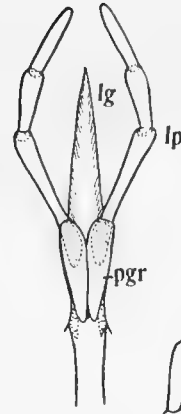


Fig. 25

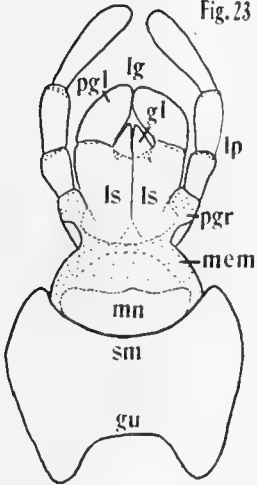


Fig. 26

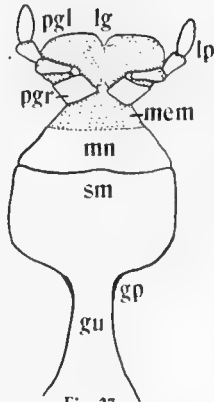


Fig. 27

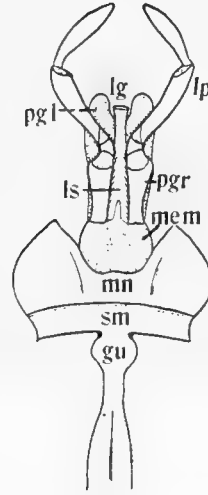


Fig. 28

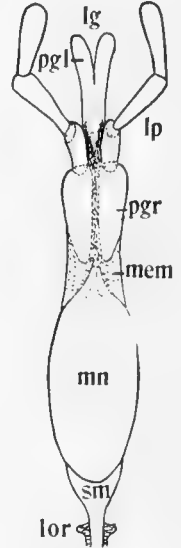


Fig. 29

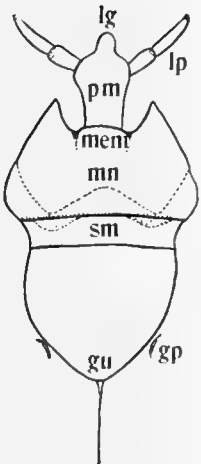


Fig. 30

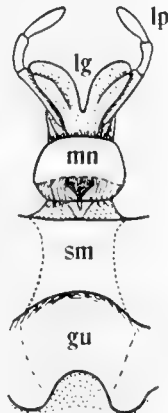


Fig. 31

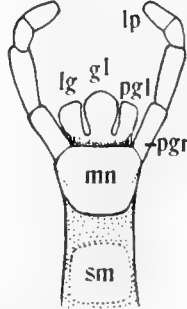


Fig. 32

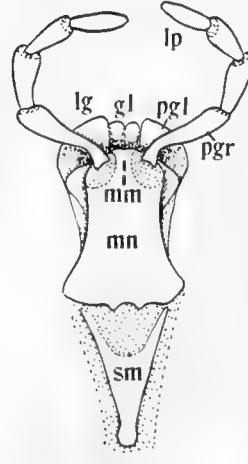


Fig. 33

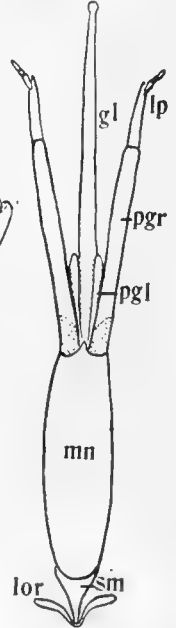


Fig. 34

CRAMPTON—LABIA OF HOLOMETABOLA.

in Fig. 8 resembles the labia of certain Diptera and Mecoptera in most respects, but it also resembles the labia of certain Coleoptera in having a distinct submentum separated from the mentum by a membrane.

In the main, the evidence of the labium is in accord with that furnished by other parts of the body, in indicating the relationships of the Holometabola suggested in previous papers, and a study of the labium would point to an Orthopteroid ancestry for the Holometabola. This Orthopteroid ancestry is doubtless to be sought in the Protorthoptera or in the common Protorthopteran-Protoblattid stem from which such forms as the Zorapterous Psocids (which approach the Holometabola very closely in many respects) were also derived.

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Abbreviations.

- gl* —Glossa.
gp —Gular pit (gulacava).
gu —Gula.
hph —Hypopharynx.
lg —Ligula (composed of united glossae and paraglossae).
lo —Palpigeral lobes.
lor —Lora.
lp —Labial palpus.
ls —Labial stipes (labiostipes).
mem —Mental membrane.
mm —Median mental process (medimentum).
mn —Mentum.
mus —Palpigero-gular muscles, connecting palpigers with gular region (or postentoria).
p —So-called "palpimaculae"; probably (chemical) sense organs.
pgl —Paraglossa.

- pgr* —Palpiger.
pgt —Palpigeral tendons.
pl —Palpal lobes (palpilobi).
pm —Prementum.
sm —Submentum.

EXPLANATION OF PLATE 6.

All of the labia are drawn from the posterior (ventral) surface. Stippling denotes membrane.

Fig. 1. Neuropteran, *Nemoptera sinuata*. Fig. 2. Mecopteran, *Bittacus* sp. Fig. 3. Dipteran, *Tanyderus*. Fig. 4. Dipteran, *Empis clausa*. Fig. 5. Dipteran, *Asyndulum montanum*. Fig. 6. Coleopteran, *Calopteron* sp. Fig. 7. Dipteran, *Edwardsina* sp. Fig. 8. Siphonapteran, *Pulex serraticeps*, after Boerner, 1903. Fig. 9. Coleopteran, *Lycus* sp.

EXPLANATION OF PLATE 7.

Fig. 10. Coleopteran, *Harpalus caliginosus*. Fig. 11. Coleopteran, *Calopteron* sp. Fig. 12. Dipteran, *Anisopus (Ryphus)*. Fig. 13. Mecopteran, *Panorpa lugubris*. Fig. 14. Trichopteran. Fig. 15. Lepidopteran, *Sabatınca* sp. Fig. 16. Coleopteran, *Phengodes* sp. Fig. 17. Neuropteran, *Sialis* sp. Fig. 18. Mecopteran, *Chorista australis*. Fig. 19. Mecopteran, *Panorpa lugubris*. Fig. 20. Dipteran, *Anisopus (Ryphus) punctatus*. Fig. 21. Coleopteran, *Eros* sp. Fig. 22. Mecopteran, *Nannochorista dipteroides*.

EXPLANATION OF PLATE 8.

Fig. 23. Neuropteran, *Corydalus cornutus*. Fig. 24. Neuropteran, *Porismus strigatus*. Fig. 25. Neuropteran, *Nemoptera sinuata*. Fig. 26. Blattid, *Periplaneta (Blatta) orientalis*. Fig. 27. Coleopteran, *Silpha* sp. Fig. 28. Coleopteran, *Harpalus caliginosus* (pale individual showing gular sutures). Fig. 29. Coleopteran, *Rhipiphorus dimidiatus*. Fig. 30. Coleopteran, *Hydrophilus* (larva). Fig. 31. Coleopteran, *Cupes* sp. Fig. 32. Hymenopteran, *Xyela* sp. Fig. 33. Hymenopteran, *Chalybion cyaneum*. Fig. 34. Hymenopteran, *Bombus* sp.

A NEW CHIGGER (TROMBICULA LARVA) FROM BRAZIL.

By H. E. EWING, U. S. Bureau of Entomology.

Professor J. Bequaert, of the Harvard School of Tropical Medicine, recently sent the writer a collection of ectoparasites from Brazil for determination. In this collection were included three lots of *Trombicula* larvae. An examination of these larvae shows that all of them belong to a single species which proves to be new. It is here described.

Trombicula brasiliensis, new species.

Larva.—Palpi of the usual shape for the genus, segment II being somewhat swollen and broadly rounded laterally. Seta on second palpal segment barbed for its whole length; seta on third palpal segment with either one or two barbs, or short lateral branches; seta on fourth palpal segment nude. Palpal claw bifurcate, with the outer division of claw much longer and stouter than the inner. Palpal thumb short, slightly swollen and not reaching the tip of the inner division of palpal claw. It bears several pectinate setae. Galeae large, cupped, over-hanging lobes; each with a simple dorsal seta. Chelicerae large and broad at the base, but tapering to the tip for their whole length. Above, each chelicera bears a minute, backwardly directed tooth near the apex, and ventrally each chelicera is notched somewhat posterior to the tooth. Dorsal shield about twice as broad as long; front margin about straight but hind margin very convex, or outwardly rounded. At each four corners and at the middle of the front margin of the dorsal shield is situated a long pectinate seta. Pseudo-stigmatic organs long, slender and pectinate except near their bases. Abdomen with fourteen pairs of dorsal setae arranged into four irregular transverse rows as follows beginning with the most anterior row: 6, 8, 8, 6. Below, the abdomen bears nine pairs of setae; an anterior transverse row of 6, followed by a transverse row of 4, then a single pair near the median line, a transverse row of 4 setae and a posterior single pair of setae near the median line. Each coxa bears a single pectinate seta, and between the first coxae there is a pair of sternal setae and also a pair between the posterior coxae.

Length (unengorged), 0.20 mm.; width, 0.16 mm.

Type host.—(?)

Type locality.—Manáos, Brazil.

Type slide.—Cat. No. 946, U. S. N. M.

Description based upon three specimens mounted on type slide. They were taken at Manáos, Brazil, July 25, 1924, and constituted a part of a lot from this place sent in by Professor Bequaert. Two other lots of the same species were received from the same authority, one taken at Carvoeiro, Brazil, August 26, 1924, and the other at Para, Brazil, July 13, 1924.

This species belongs to that group of *Trombicula* larvae in which the palpal claw is bifurcate and the outer division larger than the inner. It is nearest to *Trombicula goldii* (Oudemans), but differs from Oudemans's species in having one or two branches to the second palpal seta instead of none and in having several more abdominal setae both dorsal and ventral.

Actual date of publication, April 27, 1925.

EDITORIAL.

In the "good old days" (which people with poor memories are fond of recalling for our edification) it was not unusual for a writer, who disagreed with another on some point of doctrine or theory, to brand his opponent as a fool, a liar or a crook—possibly as all three. Criticism trumpeted a vigorous personal note. *A* attempted to establish himself as a seer by proving that *B* was something of an ass; and occasionally he succeeded—for a time. We do things differently now. The niceties of discourtesy are no longer observed. We have gone to another extreme and confided our vanities to the gentle care of discreet advertising. The boost has superseded the kick. We load our papers with testimonials in the shape of credits, appeals to authority (the lighter the paper the heavier, as a rule, the credits) and we crush competition under their weight; but we do not criticise—when we can help it. It is not good form. Occasionally, however, some one responds to the fault-exposing urge, and goes on a mild heresy hunt through another's preserves. This is not unpraiseworthy; though ordinarily it does little good and less harm to the one attacked. He too often ignores it,—but not always. Among men of science there are a few individuals, whose souls are sensitive to any prodding (the ancients, be it remembered, placed the seat of the soul in the spleen), and when such men are attacked they revert to the older type of militant personal controversialist, and burst into print with sounding praise of self and denunciation of the obnoxious dispraiser. This is all very funny, except for the sleepy editor who lets the things get by him into his journal. The sad part of the joke is on him. The rest of us should smile at it. I'm sure that I should be hilarious if I could so provoke a brother Entomologist by irreverent criticism that he, in cold print, would call me an ignoramus. I'd know that my criticism had at least enough point to it to penetrate the skin; but I'd feel a bit sorry for the editor who allowed himself to be the bow-string for my enemy's shaft. Editors are pitiful creatures anyway. It's all very funny; but it is also very childish. By our works and by our works alone we shall be judged, and the judgment will not lie with us, nor our peers nor near-peers; but with the generation to come, which—if it has not mercifully forgotten us—will sift our works carefully and weigh out from them only their substantial parts. *A*'s opinion of *B* will have mighty little weight then, and *A*'s opinion of *A* none at all. So, gentlemen, let us prove ourselves and confound our critics by better works. A truce to personalities, self praise, disparagements and the kissing back and forth of credits. But, by all means, let us have criticism—more, stricter and stronger criticism. We need it; and what we get of it now may help us withstand a future judgment which will show neither rancor nor mercy.

—*Carl Heinrich.*

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VOL. 27

MAY 1925

No. 5

NEW SERPHOID PARASITES FROM THE UNITED STATES
(HYMENOPTERA).

BY ROBERT M. FOUTS.

This paper contains descriptions of twenty-four new species and one new genus of Hymenoptera belonging to the families Platygasteridae, Diapriidae and Scelionidae.

All measurements except of antennal joints were made with a Bausch and Lomb binocular microscope, 24 mm. objective, No. 5 ocular and a micrometer disc ruled to five mm. in .05 mm. divisions. Each division equals approximately .0108 mm. Measurements of antennal joints were made with a Bausch and Lomb compound microscope, 4 mm. objective, No. 5 ocular, 160 mm. draw tube, and a micrometer disc ruled to five mm. in .05 mm. divisions.

The measurements made are close but only approximately correct. A difference of .002 mm. in antennal measurements means nothing. All measurements of a particular part are of its greatest dimensions.

The publication referred to as "(Fouts, 1924)" is the author's recent paper entitled, "Revision of the North American Wasps of the Subfamily Platygasterinae." It was published in the Proceedings of the United States National Museum, Vol. 63, 1924, pp. 1-145.

Unless otherwise mentioned the type material described below is in the author's collection.

Superfamily SERPHOIDEA.

Family PLATYGASTERIDAE.

Trichacis cornuta, new species.

Female.—Length, 1.53 mm. Runs to *cornicola* in the author's key (Fouts, 1924, p. 13). Differs from *cornicola* and *texana* in having lateral projections on the cheeks. Length of head 20, width 48; frons polished; occiput without sculpture medially; cheeks just above the middle of the compound eyes with a sharp laterally projecting tooth; pedicel a little over twice as long as wide, distinctly but only very slightly wider than any of the four following joints, a little longer than joint four which is cylindrical, twice as long as wide; length of thorax 55, width 40, height 44; notauli distinct only on basal third of mesonotum; length of abdomen 67; length of second tergite 42, width 42; first tergite as in *texana*; interfoveal area on second tergite with many short fine carinae; second tergite, except as just mentioned, and all following tergites, polished, without distinct

sculpture. Coloration as in *texana*, the flagellar joints a little darker brown, however.

Type-locality.—Brownwood, Texas.

Described from one specimen collected by the author, May 1, 1924, in Pecan Bayou.

Trichacis texana, new species.

Female.—Length, 1.59 mm. Runs to *cornicola* in the author's key (Fouts, 1924, p. 13). Has the pedicel distinctly wider than any of the four joints following it. The pedicel is, moreover, not distinctly longer than the fourth joint. Length of head 22, width 45; frons polished; occiput separated from the vertex by a sharp carina; length of thorax 55, width 36, height 43; notauli distinct on basal six-sevenths of the mesonotum; length of abdomen 70; length of second tergite 44, width 40; median area on first tergite well defined, longer than wide, with a median carina; last four tergites faintly punctulate. Black; first six antennal joints and legs in greater part, brown; club joints, coxae and femora, darker.

Type-locality.—Brownwood, Texas.

Described from one specimen collected by the author, April 24, 1924, in Pecan Bayou.

Platygaster affinis, new species.

Female.—Length, 1.34 mm. Runs to *astericola* in the author's key (Fouts, 1924, p. 30). Differs from *astericola* in not having numerous diagonally directed striae on the frons above the antennae. *Affinis* is, moreover, much darker in color but this may be due to the length of time the specimens of *astericola* have been in the collection. Length of head 20, width 36; length of thorax 47, width 34, height 34; notauli distinct on basal two-thirds of mesonotum; length of abdomen 57; length of second tergite 35, width 30; foveae not well indicated, a few striae present, the striae not attaining the middle of the segment; black to piceous, the tarsi and tibiae basally, brown.

Type-locality.—Brownwood, Texas.

Described from one specimen collected by the author, June 10, 1924, in Pecan Bayou.

Platygaster anura, new species.

Female.—Length, 1.42 mm. Differs from *minutissima* in having fine wavy aciculae above on the frons. Length of head 18, width 33; antennal joints eight and nine a little longer than wide; length of thorax 41, width 30, height 30; notauli complete; mesonotum shagreened; length of abdomen 72; length of second tergite 32, width 28; third tergite divided medially by a longitudinal incision; length of third tergite 6, of the fourth 8, of the fifth 14, and of the sixth 8; basal foveae with a few striae scarcely extending beyond their apices; abdominal tergites otherwise unsculptured; wings tinged with brown.

Male.—Length, 1.29 mm. Pedicel about one and one-half times as long as wide, twice as long but no wider than joint three; joint four wider, widened apically, slightly excavated inwardly, about as long as the pedicel; joints five to nine subequal, quadrate; ten conical, about as long as three and four united,

acute apically; length of head 19, width 36; length of thorax 45, width 32, height 32; length of abdomen 55; length of second tergite 32, width 32.

Type-locality.—Brownwood, Texas.

Described from nine specimens collected by the author, May 1, 1924, in Pecan Bayou.

Paratypes (male and female).—Cat. No. 28111, U. S. N. M.

***Platygaster filicaudis*, new species.**

Male.—Length, 2.15 mm. This species forms a new section of the genus *Platygaster* characterized by the scutellar structure. Length of head 22, width 32; head shining, finely granular; lateral ocelli their diameter distant from the eye margin; lengths of antennal joints in millimeters: 1.253, .389, .227, .497, .162, .281, .270, .281, .281, .410; widths of the same joints as follows: .324, .216, .162, .270, .194, .248, .259, .259, .248, .227; fourth joint broadly but not deeply excavated at base; pubescence on flagellar joints sparse, about half as long as the widths of the joints; length of thorax 65, width 40, height 38; thorax, except the pleurae and the propodeum, shining, finely reticulate; notauli complete, the median lobe narrowly truncated posteriorly, its apex coinciding with the apices of the lateral lobes; scutellum transversely elevated medially, granular, with a number of very small, indistinct, longitudinal carinae; dorsal plate of the scutellum upturned apically, forming a small tubercle; lengths of the tergites, beginning with the second: 50, 11, 15, 19, 13, 4; widths of the same tergites: 32, 29, 25, 20, 15, 10; second tergite subopaque, granular, with a few carinae laterally extending past the middle; basal foveae not present, or rather both foveae are merged and form one broad shallow depression; third and fourth tergites finely reticulate; fifth tergite finely reticulate, with a delicate median carina and several even more delicate ones laterally; sixth tergite finely reticulate, polished posteriorly; seventh tergite polished; wings hyaline, the anterior pair 135 in length; black; legs rufous; last joint of each tarsus dark brown; scape rufous on basal half; antennal joints dark brown.

Type-locality.—Paradise Key, Florida.

Described from one specimen collected by the author, Feb. 27, 1919.

***Platygaster kalmiae*, new species.**

Male.—Length, 1.73 mm. Runs to *artimesiae* in the author's key (Fouts, 1924, p. 28) and differs in having the frons much more strongly sculptured. Length of head 24, width 46; frons entirely strongly aciculate, transversely striate above the antennae; occiput strongly carinate; fourth antennal joint a little wider than the pedicel, slightly emarginate basally, scarcely widened apically; ninth antennal joint about as wide as long; length of thorax 65, width 41, height 45; notauli sharply indicated to middle of mesonotum; scutellum evenly convex, highly elevated, sparsely pubescent; length of abdomen 71; length of second tergite 45, width 43; striae extending to the middle of the segment; black; antennae piceous; legs dark brown; anterior femora and tibiae, in part, yellowish.

Type-locality.—Glen Echo, Maryland.

Described from two specimens collected by the author, April 24, 1918, on the leaves of mountain laurel.

Paratype.—Cat. No. 28112, U. S. N. M.

Platygaster minutissima, new species.

Male.—Length, 0.87 mm. Runs to *americana* in the author's key (Fouts, 1924, p. 25). Length of head 13, width 25; frons polished, without apparent sculpture; occiput finely striate; pedicel one and one-half times as long as wide; fourth joint about as long as the pedicel, excavated inwardly, broad; ninth joint quadrate; length of thorax 30, width 23, height 23; mesonotum shagreened, smoother posteriorly; length of abdomen 38; length of second tergite 19, width 22; foveae indicated by a short acute ridge inwardly, without distinct striae; black; anterior trochanters, anterior tibiae, tarsi, and flagellum, brownish.

Type-locality.—Brownwood, Texas.

Described from one specimen collected by the author, May 1, 1924.

Platygaster perplexa, new species.

Male.—Length, 1.42 mm. Runs to *vernalis* in the author's key (Fouts, 1924, p. 27). Differs from *vernalis* and *tacita* in many ways as the following description shows: length of head 22, width 33; frons subopaque by reason of a fine sculpture, finely carinate above the antennae; occiput finely reticulate; all antennal joints longer than wide, the flagellar joints densely covered with rather long whitish hairs; fourth joint a little longer than the pedicel, about as long as the sixth, excised basally but not much wider apically than basally, less than twice as long as wide; following joints subequal in width, gradually increasing in length; ninth joint about three times as long as wide; tenth joint much longer, acuminate, seven or eight times as long as wide; length of thorax 46, width 30, height 31; notauli distinctly indicated to anterior third of mesonotum; scutellum rather small, nearly flat, sparsely pubescent; wings a little longer than the whole length of the body, narrow, ciliate marginally; abdomen convex above and below, without sculpture or appreciable pubescence; length of abdomen 63; length of second tergite 40, width 33; basal foveae extremely minute, without sculpture; body piceous to dark reddish-brown; scape yellowish basally; all coxae and trochanters yellow; rest of legs brownish-yellow; tarsi yellow.

Type-locality.—Grant, Colorado.

Described from one specimen collected by the author, July 21, 1916.

Platygaster scutellator, new species.

Male.—Length, 0.83 mm. This species and the one immediately following form a new section of the genus *Platygaster* characterized by the mesonotal structure. The posterior lobe of the mesonotum extends tongue-like over about half of the scutellum and is truncated apically. The scutellum is densely pubescent except for a small area on top, is very short and declivous posteriorly. Length of head 13, width 24; face without distinct sculpture; vertex with a few transverse carinae; lateral ocelli a little less than their own diameter distant from the margin of the eye; pedicel scarcely longer than wide, a little narrower than the fourth joint; fourth joint somewhat less than twice as long as wide,

cylindrical, shorter than the ninth joint, the latter about twice as long as wide; length of thorax 32, width 21, height 25; mesonotum polished, without sculpture; notauli briefly indicated posteriorly; abdomen broadly ovate, subacute apically; length of abdomen 32; length of second tergite 16, width 19; basal foveae small, with one or two faint carinae outwardly, the carinae not extending posteriorly to the apices of the foveae; interfoveal area not sculptured; wings hyaline, with long fringes, the anterior ones 70 in length; body shining black; legs golden-brown, the femora and tibiae apically and the posterior tarsi entirely, darker.

Type locality.—Glen Echo, Maryland.

Described from one specimen collected by the author, July 4, 1919.

Platygaster rufidens, new species.

Male.—Length, 0.75 mm. Length of head 13, width 22; face without distinct sculpture; vertex with a few transverse carinae; lateral ocelli as in *scutellator*; lengths of antennal joints in millimeters: .156, .041, .012, .053, .037, .051, .053, .055, .055, .090; widths of the same joints as follows: .027, .025, .016, .027, .023, .025, .025, .027, .025, .025; length of thorax 30, width 19, height 21; thorax otherwise as in the preceding species; length of abdomen 26; length of second tergite 16, width 16; basal foveae with several carinae within their borders; interfoveal area with a very small sulcus basally; wings hyaline, with long fringes, the anterior pair 64 in length; body shining black; legs dark brown, except all trochanters, anterior and middle tibiae basally, and anterior and middle tarsi (the last joint of each excepted). The parts just mentioned yellow to golden brown.

Type locality.—Glen Echo, Maryland.

Described from one specimen collected by the author, July 15, 1917.

Platygaster signata, new species.

Female.—Length, 1.90 mm. This species with *floridensis*, *caryae*, and *anormis* form a distinct group characterized by the scutellar structure. The scutellum is highly elevated, declivous anteriorly and posteriorly, not evenly shagreened in any place, but rather, roughened anteriorly, obscurely longitudinally striate anteriorly. *Signata* differs from *caryae* in not having the second tergite extensively striate. Length of head 28, width 55; head sculptured as in *caryae* (See Fouts, 1924, p. 37), somewhat more delicately so, however; scape long and slender, as long as the six succeeding joints united; pedicel nearly three times as long as wide, narrowed basally, distinctly longer than either the third or fourth joints; third joint about as long as the fourth, narrower than the fourth, a little over twice as long as wide; fourth joint wider than the pedicel, less than twice as long as wide; following six joints forming a club, all of them, except the last, transverse; length of thorax 73, width 50, height 50; notauli distinct to middle of mesonotum; mesonotum in greater part minutely reticulate; length of abdomen 75; length of second tergite 52, width 50; foveae deep and broad, on each side with a few striae which do not extend past their apices; shining black; antennae, except the terminal six joints, and legs, except the coxae and posterior femora, brownish-yellow.

Type-locality.—Brownwood, Texas.

Described from three specimens collected by the author, in May, 1924, on Pecan leaves.

Paratype.—Cat. No. 28114, U. S. N. M.

Platygaster striatifrons, new species.

Male.—Length, 1.96 mm. This species forms a new group characterized by the scutellar structure. The dorsal surface of the scutellum is strongly convex, and the posterior face has an inverted U-shaped carina upon it. Length of head 23, width 53; frons strongly transversely carinate just above the antennae, with wavy aciculae otherwise; occiput strongly arcuately carinate; fourth antennal joint about as long as the fifth, distinctly emarginate basally, not widened at apex; following joints to the tenth subequal, a little longer than wide, densely covered with short silvery hairs; tenth joint cylindrical, a little narrower than the ninth, subacute apically; length of thorax 73, width 50, height 55; mesonotum strongly convex, without distinct sculpture, and without notauli except at extreme base; scutellum densely covered with moderately long silvery hairs; length of abdomen 85; length of second tergite 51, width 48; basal foveae rather long and moderately deep, with numerous striae extending beyond the middle of the segment; shining black; antennae piceous; legs dark brown; anterior femora in greater part, anterior tibiae and tarsi yellowish-brown.

Type-locality.—Glen Echo, Maryland.

Described from four specimens collected by the author, April 24, 1918. Two of the specimens were collected on the leaves of skunk cabbage and one on the leaves of mountain laurel.

Paratype.—Cat. No. 28115, U. S. N. M.

Platygaster tacita, new species.

Female.—Length, 1.36 mm. Runs to *vernalis* in the author's key (Fouts, 1924, p. 27). Length of head 21, width 39; frons finely diagonally aciculate; occiput rather strongly striate; antennae not attenuate, the eighth and ninth joints about as wide as long; length of thorax 50, width 33, height 35; median lobe of mesonotum broadly rounded, not touching the scutellum; length of abdomen 55; length of second tergite 34, width 32; foveae deep, rather narrow, the striae very numerous, not reaching the middle of the segment; following tergites short, not sculptured; black, tarsi piceous.

Type locality.—Brownwood, Texas.

Described from one specimen collected by the author, May 1, 1924, in Pecan Bayou.

EUXESTONOTUS, new genus.

This genus differs from *Platygaster* in having a narrow scutellar suture and parallel, widely separated notauli. The notauli diverge slightly in front of the scutellum:

In *Platygaster* there is a rather broad depression between the scutellum and the mesonotum. The posterior margin of the mesonotum and the anterior margin of the scutellum are distinctly depressed. Such is not the case in

Euxestonotus. The two sclerites are not separated by a depression but rather by a very narrow suture. The notauli always converge posteriorly in *Platy-gaster*.

It is possible that *Euxestonotus* includes forms which Foerster had in mind when he described his genus *Xestonotus*.

Genotype.—*Anopedias error* Fitch.

TABLE OF SPECIES.

- 1. Legs yellow..... *flavipes* n. sp.
 Legs mostly black or brown..... 2.
- 2. Head less than twice as wide as long..... *rufidens* n. sp.
 Head about twice as wide as long..... 3.
- 3. Antenna elongate, the ninth joint longer than wide..... *error* (Fitch).
 Antennae shorter, the ninth joint quadrate..... *brevicornis* n. sp.

***Euxestonotus flavipes*, new species.**

Female.—Length, 1.10 mm. Length of head 17, width 30; frons polished; occiput reticulate; antennal joints four to nine subequal in length, all a little longer than wide; length of thorax 39, width 26, height 27; length of abdomen 46; length of second tergite 30, width 24; basal foveae not present, a few short striae indicating their position; legs, scape, second and third antennal joints, and mandibles, stramineous; rest of antennae brownish.

Type-locality.—Glen Echo, Maryland.

Described from two specimens collected by the author, July 15, 1917.

Paratype.—Cat. No. 28116, U. S. N. M.

***Euxestonotus rufidens*, new species.**

Male.—Length, 1.27 mm. Length of head 20, width 33; frons polished; occiput reticulate; fourth antennal joint about as long as the pedicel, slightly widened at extreme apex and sharply acute outwardly; joints six to ten a little longer than wide, cylindrical, pilose; length of thorax 50, width 31, height 36; length of abdomen 48; length of second tergite 35, width 32; striae rather numerous, extending to middle of segment; body shining black; trochanters, all tibiae basally, and the anterior tibiae apically, and the tarsi, yellowish; mandibles rufous; antennae piceous, the scapes below, yellow.

Type locality.—Carlisle, Pennsylvania.

Described from five specimens collected by the author. They were collected, July 30, and August 4, 1920, on the leaves of mulberry and wild cherry trees.

Paratype.—Cat. No. 28117, U. S. N. M.

***Euxestonotus brevicornis*, new species.**

Female.—Length, 1.03 mm. Length of head 16, width 30; frons polished; occiput reticulate; pedicel about as long as the two following joints united, as wide as the fourth, less than twice as long as wide; joints seven, eight, and nine subequal, quadrate; ten a little longer, conical, subacute apically; length of thorax 37, width 25, height 27; thorax polished, except the anterior part of the

mesonotum which is delicately reticulate; length of abdomen 42; abdomen polished and unsculptured except for the striae on the second tergite; length of second tergite 27, width 22; striae few, not attaining the middle of the segment; shining black; trochanters, femora, tibiae and scapes basally, and tarsi, yellowish to brown.

Type locality.—Glen Echo, Maryland.

Described from two specimens collected by the author in the summer of 1923.

Paratype.—Cat. No. 28118, U. S. N. M. This specimen is slightly smaller than the type.

Leptacis angustula, new species.

Female.—Length, 0.99 mm. Runs to *pennsylvanica* in the author's key (Fouts, 1924, p. 117). Differs from *pennsylvanica* and *carinator* in the structure of the scutellum and the head. Length of head 14, width 21; head shaped much as in *Cephalonomia*, the height of the head above the eyes being three-fourths the length of the eyes; frons polished; vertex and occiput without distinct sculpture; pedicel about twice as long as wide, a little longer than the following two joints united, nearly twice as wide as the third joint; joints three, four, and five subequal in width, the third distinctly the longest; joint nine wider than long; ten less than twice as long as wide, conical; length of thorax 36, width 17, height 21; thorax without distinct sculpture, sparsely covered above with short white hairs; notauli absent, their origins indicated by the median lobe which projects upon the anterior margin of the scutellum; scutellum about as wide as long, with a few short hairs laterally, the spine very short and inconspicuous; marginal cilia on anterior wings very short; length of abdomen 42; greatest thickness of abdomen 12; abdomen highly polished, without sculpture; length of second tergite 25, width 16; no pubescence on second tergite except two small patches basally; body shining black; scape, pedicel, trochanters, anterior femora apically, anterior tibiae in greater part, middle and posterior tibiae apically, and all tarsi, yellowish to light brown.

Type locality.—Glen Echo, Maryland.

Described from one specimen collected by the author, April 24, 1918.

Leptacis platygaster, new species.

Female.—Length, 1.49 mm. Runs to *pallipes* in the author's key (Fouts, 1924, p. 117). Differs in having the abdomen long and flat. Length of head 17, width 31; frons delicately reticulate laterally, more distinctly so above on the sides; occiput without distinct sculpture; scape rather short and thick, a little wider than joint nine, as long as the five following joints united; pedicel less than twice as long as wide, as long as, but considerably narrower than joint seven; joints three to six subequal in width, the fourth distinctly the longest; sixth joint a little wider, as long as the fifth; joints seven to ten subequal, about as wide as long; joint ten longer and narrower, about twice as long as wide, conically acute apically; length of thorax 47, width 23, height 31; thorax polished, without sculpture, sparsely covered with very short hairs dorsally; notauli absent; median lobe of mesonotum very minute, not touching the scutellum; scutellum

as in *angustula* but with the spine about half as long as the scutellum, abruptly turned downward at apex, forming a hook; cilia on anterior wings rather long, much longer than in *angustula*; length of abdomen 74; length of second tergite 34, width 27; greatest thickness of abdomen 8; black; scape and legs, except coxae, yellowish-brown; posterior femora infuscated.

Type locality.—Washington, D. C.

Described from one specimen collected by the author, September 24, 1923.

This species and *angustula* approach the forms one would expect to find in *Piestopleura*.

Leptacis carinator, new species.

Female.—Length, 1.13 mm. Runs to *pennsylvanica* in the author's key (Fouts, 1924, p. 117). Length of head 15, width 26; frons shining, traversed by a number of distinct carinae much as may be found in *Platygaster vernalis* Myers although with fewer carinae than in that species. There is scarcely any further difference between this species and *pennsylvanica*. Length of thorax 41, width 21, height 30; length of abdomen 48; length of second tergite 32, width 23; following segments polished, without pubescence; last tergite subopaque, with a delicate sculpture.

Type-locality.—Brownwood, Texas.

Described from one specimen collected by the author, May 1, 1924, in Pecan Bayou.

Leptacis dubiosa, new species.

Male.—Length, 1.85 mm. Runs to *floridana* in the author's key (Fouts, 1924, p. 135). Length of head 21, width 36; head entirely finely shagreened; antennae densely pubescent, the hairs nearly as long as the joints are wide; fourth joint a little over twice as long as wide, more or less spindle-shaped, a little wider than the pedicel; eighth and ninth joints about twice as long as wide; length of thorax 75, width 30, height 33; anterior wings very nearly glabrous, without marginal cilia; length of abdomen 75; length of second tergite 40, width 28; length of third tergite 8; tergites four to six subequal, about as long as the third; last tergite very short, not half as long as the sixth; tergites three to seven delicately shagreened.

Type-locality.—Brownwood, Texas.

Described from one specimen collected by the author, May 1, 1924, in Pecan Bayou.

Leptacis abductor, new species.

Female.—Length, 1.27 mm. Runs to *punctata* in the author's key (Fouts, 1924, p. 117). The abdomen in this species is distinctly longer than the head and thorax united. Length of head 16, width 28; head dully shining, reticulate; ocellular line nearly as great as the interocellar; seventh antennal joint a little longer than wide, slightly longer than joint eight; joints eight and nine quadrate; ten longer than nine, less than twice as long as wide, subacute apically;

length of thorax 37, width 24, height 25; length of anterior wing 87; length of abdomen 65; width of second tergite 26; length of second tergite 26, of the third 5, of the fourth 10, of the fifth 12, and of the sixth 10; tergites three to six shagreened, the third and sixth less strongly so; sixth tergite triangular, acute apically; black; scape yellowish basally; legs brown to yellowish-brown in greater part; last joint of each tarsus black.

Type-locality.—Brownwood, Texas.

Described from one specimen collected by the author, June 15, 1924, in Pecan Bayou.

Leptacis texana, new species.

Male.—Length 1.33 mm. Runs to *aciculata* in the author's key (Fouts, 1924, p. 118). The second tergite in *aciculata* is distinctly longer than wide and is faintly shagreened in a narrow band apically. In *texana*, on the contrary, the second tergite is about as wide as long and is not distinctly sculptured. Sculpture of the body, with the exception noted above, as in *aciculata*. Length of head 20, width 40; lengths of antennal joints in millimeters: .281, .059, .033, .109, .062, .090, .084, .086, .086, .103; widths of the same joints as follows: .039, .035, .031, .033, .029, .037, .039, .039, .039, .031; hairs on flagellar joints scattered, long; length of thorax 55, width 36, height 38; mesonotum and scutellum as in *aciculata*; length of abdomen 48; length of second tergite 37, width 37; black, trochanters, tibiae basally, and tarsi, except the last joint of each, brown; legs otherwise dark brown to black.

Type-locality.—Brownwood, Texas.

Described from eight specimens collected by the author, April 21, 1924, in Pecan Bayou.

The following note was made at the time the specimens were collected: Flying in sunshine at tips of twigs; tree about seven feet high, two inches in diameter; bark smooth; leaves alternate.

Paratypes.—Cat. No. 28119, U. S. N. M. Four specimens.

Family DIAPRIIDAE.

Idiotypa pallipes, new species.

Female.—Length, 1.56 mm. Length of head 26, width 35, height 29; scape as long as the two following joints united, about twice as long as wide; about as wide as the seventh joint; third joint as wide but longer than the fourth; joints four to seven subequal in length and width, about as wide as long; eighth joint a little wider and longer, spherical; following four joints much wider, transverse, the eighth joint the narrowest; last joint conical, a little longer than wide; length of thorax 48, width 38, height 31; scutellum with one fairly large fovea basally and one smaller one on each side of it; length of abdomen 70; height 28; first segment a little longer than wide, with a number of longitudinal ridges dorsally and laterally; length of second tergite 50, width 37; second tergite with three short sulci basally; wings hyaline; venation as in *pallida* Ashm.; black; basal four antennal joints brown; legs, except last joint of tarsi, pale yellow; middle femora infuscated above.

Type-locality.—McLean, New York.

Described from one specimen sent to me by Mr. M. D. Leonard of Cornell University for determination. This specimen was collected by Professor C. R. Crosby, June 21, 1924, from spider material by sifting.

Family SCELIONIDAE.

Hoplogryon coxalis, new species.

Female.—Length, 1.0 mm. Differs from *claripennis* Ashm., in having the wings tinged with brown. Length of head 18, width 34; frons polished, with a delicate median carina below; malar area striate; occiput delicately shagreened; third antennal joint distinctly longer than the second or fourth, nearly twice as long as wide; joints two, three, and four subequal in width, the second and fourth of about the same length; club joints closely united, transverse; last joint about as long as wide, conical, blunt at apex; length of thorax 33, width 31, height 30; mesonotum obscurely delicately sculptured, pubescent; scutellum polished; anterior wings brownish, with long cilia; length of abdomen 50; abdomen egg-shaped, strongly convex above; first and second tergites with many deep longitudinal grooves, those on the second tergite extending to the apical third of the segment; length of third tergite 22, width 32; third tergite shining, very delicately reticulate; fourth tergite finely shagreened at base, black; scape at base, mandibles, and all legs in greater part, yellow; antennae piceous; anterior femora in greater part, middle and posterior femora at extreme apex, and all tibiae and tarsi, brownish.

Type-locality.—Suffern, New York.

Described from one specimen collected by C. R. Crosby, May 26, 1924.

**A NEW SPECIES OF LEPTOSTYLUS FROM THE UNITED STATES
(COLEOPTERA: CERAMBYCIDAE).**

BY W. S. FISHER, *U. S. Bureau of Entomology.*

Leptostylus knulli, new species.

Form similar to *Leptostylus tuberculatus* Fröl., uniformly pale reddish-brown, rather densely clothed with cinereous and brownish-yellow recumbent pubescence, the pronotum with a few more or less distinct darker areas, and elytra ornated with irregularly placed tufts of long black or yellowish-white hairs, and with an elongate black area along the lateral margins; mandibles reddish-black; palpi brown, with the tips slightly paler.

Head quadrate in front of antennal tubercles, slightly convex, rather deeply angularly depressed between the antennal tubercles, which are moderately developed but not widely separated at the base, the surface finely, densely punctate, rather densely clothed with moderately long recumbent brownish and yellowish-white pubescence, more or less mottled, not quite concealing the punctuation, and with a narrow longitudinal groove extending from the epistoma to occiput; eyes rather large, moderately granulated, deeply emarginate, and separated from each other on the top by about the width of the emargination

of the eyes in front, the lower lobes rounded and rather strongly convex, and the upper lobes smaller and narrow. Antennae slightly longer than the body, mottled with short whitish and brownish pubescence, and the outer joints more or less annulated with brown at base and apex; first joint slender, cylindrical, gradually expanded toward apex, extending nearly to base of pronotum, and subequal in length to the third joint, which is only slightly longer than the fourth.

Pronotum about three-fifths wider than long, and the apex and base about equal in width; sides feebly constricted near base, and with a more or less distinct obtuse tubercle placed slightly behind the middle; surface feebly transversely depressed along base and anterior margin, with five more or less distinct obtuse tubercles on the disk, placed transversely in two rows, two anteriorly and three posteriorly, rather coarsely and densely punctate, rather densely clothed with brownish-white pubescence, and ornated on each side behind the lateral tubercle with a blackish area, and a similar colored longitudinal vitta on each side of the middle, the vittae extending from lateral margin to base and more or less broadly interrupted on disk. Scutellum triangular, slightly broader than long, and broadly rounded or subtruncate at apex.

Elytra not quite two times as long as wide, and about one-half wider than pronotum at base; humeri prominent and rather strongly elevated; sides nearly parallel to apical third, then strongly arcuately attenuate to the tips, which are obliquely truncate internally, obsolete arcuately emarginate, and with the exterior angles obtuse; surface more or less uneven, with a broad transverse depression on disk at basal third, with numerous irregularly placed tubercles, and with the sides abruptly declivous and more or less longitudinally concave, coarsely and rather densely punctate, rather densely clothed with cinereous and brownish-yellow pubescence, and with tufts of longer black or yellowish-white hairs on the tubercles, and each elytron with a longitudinal black vitta along the lateral margin extending from the humerus to near the tips of the elytron, with a more or less distinct black oblique fascia at apical third, in front of which the pubescence is slightly more cinereous.

Beneath finely, densely punctate, not very densely clothed with brownish and yellowish-white pubescence, which gives the surface a more or less mottled appearance, and sometimes the tibiae at apex, and tarsi of a darker brown color; last abdominal segment broadly rounded and feebly emarginate in the male, and longer and more acutely rounded in the female; prosternal process about one-half as wide as the coxal cavity; femora very strongly and abruptly clavate at apex.

Length, 7.5–10 mm.; width, 3.2–4 mm.

Type locality.—Dorchester County (near Lloyds), Maryland.

Other localities.—Piney Point, Maryland; Oak Grove, Alabama; and Hope, Arkansas.

Type, allotype and paratypes.—Cat. No. 27918, U. S. N. M.

Paratypes.—Collection J. N. Knull.

Described from seven specimens, three males and four females. The type (male), allotype, and one female paratype collected at the type locality, July 10, 1907, by H. S. Barber; one male paratype from Piney Point, Maryland (Hubbard and Schwarz); one

female paratype collected at Oak Grove, Alabama, June 17, 1893 (H. Soltau Coll.); and a male and female paratype received from J. N. Knull, which were collected at Hope, Arkansas, June 5, 1922, by Louise Knobel.

The dark markings in this species are more or less variable, in some specimens the two black vittae on the pronotum are nearly obsolete, and the tufts of black hairs on the elytra are mostly replaced by tufts of yellowish-white hairs.

This species is allied to *terraecolor* Horn, but in that species the pubescence is more ochraceous, without the longer tufts of black hairs on the elytra, sides of pronotum arcuately rounded without a distinct lateral tubercle, antennae longer, and the elytra without the longitudinal black vittae along the lateral margins.

A NEW CUBAN TERMITE.

BY T. E. SNYDER, *U. S. Bureau of Entomology.*

Dr. Barbour and Mr. Brooks recently collected a new termite in Cuba. It is characterized by dark antennae, rather narrow nasus, and short points to the mandibles.

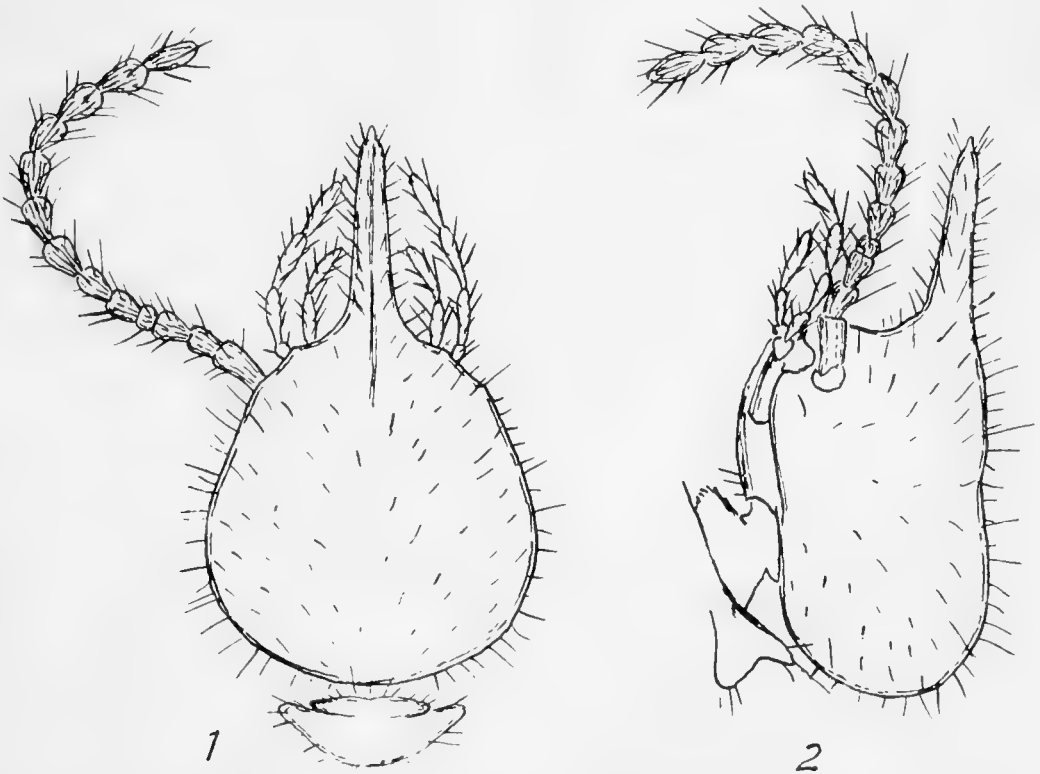


Fig. 1. *Nasutitermes (Tenuirostritermes) brooksi*. Dorsal view of head and pronotum.

Fig. 2. *Nasutitermes (Tenuirostritermes) brooksi*. Lateral view of head and pronotum.

Drawings by Miss E. T. Armstrong.

Nasutitermes (*Tenuirostritermes*) brooksi, new species.

Soldier.—Head light yellow-brown (light castaneous), lighter colored posteriorly; widest posteriorly, narrowed anteriorly, slightly constricted at about middle, slightly convex in profile except for depression at middle; with dense fairly long hairs, and longer hairs on the anterior and posterior portions; a small process on front of head between antennae and nasus. Nasus reddish-brown to blackish, elongate, slender, conical, with dense fairly long hairs. Mandibles with sharp points, but points fairly short.

Antenna grey-brown, with 12-13 segments, segments relatively short, with long hairs; second and third segments approximately equal (subequal); when 13 segmented, fourth segment short and ring-like; when 12 segmented, fourth segment approximately as long as or longer than third and broader; fifth segment longer; segments become longer and broader towards apex; last segment slender and sub-elliptical.

Pronotum light yellow-brown, darker anteriorly; saddle-shaped, anterior margin high, rounded, slightly emarginate, posterior margin rounded, emarginate with short and long hairs.

Legs yellowish, fairly elongate and slender, with long hairs.

Abdomen grey-brown, with dense fairly long hairs, a row of longer hairs at the base of each tergite; cerci fairly prominent.

Measurements:

Length of entire soldier: 2.20 mm.

Length of head with nasus: 1.10 mm.

Length of head to anterior: 0.70 mm.

Length of nasus: 0.40 mm.

Length of pronotum: 0.20 mm.

Length of hind tibia: 0.90 mm.

Width of head (at posterior, where widest): 0.65 mm.

Width of head (at anterior, where narrowest): 0.45 mm.

Width of pronotum: 0.35 mm.

The soldier of *T. brooksi* Snyder, though smaller, is similar in size and shape to *Obtusitermes aequalis* Snyder from Cuba, but is darker and has one more segment to the antennae and has points to the mandibles; *O. aequalis* may be a *Tenuirostritermes*.

Post-clypeus of worker dirty white with tinge of yellow, about one-half as long as broad, arched, with long hairs.

Type locality.—Soledad, Cienfuegos, Cuba.

Described from a series of soldiers and workers collected by Dr. T. Barbour and Mr. Winthrop Sprague Brooks at the type locality, under stone?, in April, 1924. Named in honor of Mr. Brooks of the Boston Society of Natural History.

Type, soldier.—Cat. No. 15067, Museum of Comparative Zoology, Cambridge, Mass. Paratype in U. S. N. M.

SOME AMERICAN SYRPHIDAE (DIPTERA).

BY RAYMOND C. SHANNON, *U. S. Bureau of Entomology.*

A number of species of Syrphidae of various genera from North, Central and South American countries are here described.

Chrysogaster ithaca, new species.

The present species is of special interest as it is our first eastern United States form belonging to a group of Pacific Coast species, the original members of which were described under the genus *Chilosia*. It bears a strong superficial resemblance to *Chilosia comosa* Loew.

Male.—Head large, broader than high; ocellar triangle slightly protuberant, black pilose; frontal triangle somewhat inflated with sparse black pile; antenna very small, brownish, above middle of head; arista equal to half the width of the face, measured across middle; face broad, but much higher than broad; with a small rugulose patch on each side and a small central tubercle; thoracic dorsum with fairly long, black pile, nearly erect, directed slightly backward; wings with yellowish brown tinge; apical crossvein directed outward, its extreme tip turned upward; petiole beyond first posterior cell but little longer than discal crossvein; penultimate section of fifth vein straight; petiole beyond anal cell noticeably shorter than in *nigripes*, evanescent at tip; squamae smoky, halteres yellowish; outer styles broad.

Type-locality.—Ithaca, New York, June (R. C. Shannon).

Type.—Cat. No. 27815, U. S. N. M.

C. nigripes differs by having the antennae placed at middle of head; a much larger frontal triangle; longer petioles beyond first posterior and anal cells; and the penultimate section of fifth vein distinctly bowed downward. *C. versipellis* has the face and frontal triangle more sharply convergent above; the frontal triangle distinctly smaller; outer styles much narrower.

Chrysogaster neotropica, new species.

Belongs to *nitida* group: first two tarsal joints bright yellow; antennae elongate; apical crossvein rectangular; stigma about as long as distance between the tips of second and third vein; mesonotum coppery vittate.

Female.—Linear markings of eye extremely labyrinthine; transverse marking nearly obsolete; antennae reddish yellow, moderately elongate, not as long as width of face at antennal base; first joint very short; second subequal to third; six mesonotal stripes, the lateral ones inconspicuous; scutellum subquadrate; legs bluish black with bases and apices of tibiae and the two basal tarsal joints yellow (three on hind tarsus); abdomen broad and flat, the disc subopaque; wings hyaline with dark spots as follows: just beyond middle of marginal cell; at tip of second vein and extending across to tip and along the apical crossvein at tip of submarginal cell; on discal and posterior crossveins and middle of discal cell. Length, 5 mm., wing, 3.75 mm.

Type-locality.—San Bernardino, Paraguay (K. Fieber).
Type.—Cat. No. 27814, U. S. N. M.

Tribe MYIOLEPTINI, *sensu stricto*.

The genus *Myiolepta* Newman (1838) was established for *Musca luteola* Gmelin, a European species. Twelve American species have been described under the name *Myiolepta*.

The writer, in his revised key to the American genera of Syrphidae (1921) erected the genus *Eumyiolepta* for *Myiolepta strigilata* Loew. In a later paper (1922) he called attention to the fact that *Lepidostola* Mik. (1886) was a member of the Myioleptini (previously associated with *Chrysogaster*) and gave a key to the three genera of the tribe.

Another species has come to hand which typifies a fourth genus of Myioleptini.

KEY TO THE GENERA OF MYIOLEPTINI.

- A1. Face concave or flat, with tubercle in male; metasternum membranous behind.
 - B1. Body pile normal, composed of small hairs.....*Myiolepta* Newman.
 - B2. Body pile modified, scale-like.
 - C1. Antenna moderate, second and third joints as broad as long.....
Eumyiolepta Shannon.
 - C2. Antenna much elongated, second and third joints much longer than broad*Lepidostola* Mik.
- A2. Face with strong carina; metasternum girdled with a chitinous band; thorax without tomentum.....*Zonemyia*, new genus.

Probably all of the tropical species described under *Myiolepta* will be found to belong to genera other than *Myiolepta*, *sensu stricto*.

Lepidostola has also been recorded under *Lepidomyia decessum* Hutton by Miller (Trans. New Zealand Institute, LIII, 294, 1921), from New Zealand. The writer has seen specimens of this species in Mr. W. M. Davidson's collection. It belongs to the genus *Psilota*.

***Lepidostola jenningsi*, new species.**

A remarkable species, peculiarized by the thorn-shaped scutellum.

Male.—Head flat in appearance, not much broader than high; ocellar triangle small, strongly protuberant, shining black; frontal triangle pollinose at apex, and lower corners shining black and bare above antennae; face broad, narrowing a little below, flat in profile with small median tubercle, mainly shining black through middle, densely pollinose on sides; antenna yellowish brown, slender, very elongate, nearly equal to height of head, first joint more than twice as long as broad, subequal to second, the third longer than first two together; arista much shorter than third joint; mesonotum with very short black pile on disc with scattered yellow scales intermixed; anterior margin of mesonotum with broad band of yellow tomentum; band of yellow tomentum behind transverse

suture broadly interrupted in middle; posterior margin with yellow tomentose band which extends forward on sides nearly to suture; scutellum with short stiff yellowish and black hairs, produced behind to a sharp point, in general appearance like that of a very stout thorn, or a nearly equilateral triangle; pleurae shining black with a very few widely scattered whitish scales; femora stout, strongly spinose below, black with the bases sharply yellowed, apices briefly yellow; tibia black with yellow bases; tarsi yellow, last two joints in all cases black; second and third abdominal tergites subopaque black with shining metallic lateral margins and the third with broad band of dark metallic coloration; fourth tergite shining bronze with scattered white scales; wings hyaline; discal crossvein near base of discal cell; first posterior cell with very short petiole beyond; spurious vein absent; squamae white, halteres yellowish. Length, 6.5 mm., wing, 5 mm.

Type-locality.—Canal Zone, Panama (A. H. Jennings).

Type.—Cat. No. 27856, U. S. N. M.

The specimen was evidently reared as the pin also bears three puparia. No rearing data is available, however. Mr. C. T. Greene states that the puparia greatly resemble the *Myiolepta* type which is added proof of the relationship of *Lepidostola* to *Myiolepta*. The head greatly resembles that of the *Chrysogasterae* as claimed by Williston, but this seemingly is a coincidence.

ZONEMYIA, new genus.

Face with a deep cavity below antennae, which is directly raised to a strong keel which continues to oral margin; thorax without tomentum, the usual pile extremely reduced, apparently absent; anterior margin of mesonotum armed with a transverse row of short, stout black spines (always?); metasternum with a band of chitin extending clear across its posterior surface.

Genotype.—*Zonemyia spinosa*, new species.

Zonemyia spinosa, new species.

Male.—Head very broadly elliptical; ocellar triangle very large, blackish in vicinity of the ocelli but yellowish pollinose before and behind; eyes narrowly separated; frontal triangle and face, except carina and jowls, densely golden pollinose; face with fairly deep but short concavity below antennae then raised to a strong straight keel which extends to oral margin; upper posterior rim of head armed with short stout black spines; mesonotum black with numerous minute hair tubercles bearing minute hairs; three golden pollinose transverse stripes, the anterior pair placed before middle of thorax, interrupted in middle; posterior one in front of scutellum; a row of short stout spines along anterior margin of first transverse stripe; the second one extending well onto the pleurae; scutellum yellow pollinose; fore and mid femora slightly swollen, the anterior pair simple, mid pair with few small ventral spines; hind femur much swollen, spinose on ventral surface; tibiae reddish brown, fore pair darkened apically; fore tarsi enlarged (as in *Temnostoma* and *Sphecomyia pattoni*) black; mid and hind tarsi normal, yellowish; abdomen very insignificantly pilose; constricted at second and third segments, second tergite with pair of shining brassy spots;

third and fourth tergites brassy on sides, subopaque medianly, with pale short pile; wings smoky; petiole beyond first posterior cell nearly as long as discal crossvein; apical crossvein angulated. Length, 7.75 mm., wing 5.5 mm.

Female.—Front variegated golden and blackish pollinose, at vertex equal to length of third joint; at antennal base slightly longer than length of antennae.

Type-locality.—Trinidad River, Panama.

Type.—Cat. No. 27828, U. S. N. M.

Holotype male and allotype female, June 2, 1911 (A. Busck).

Another male specimen, Trinidad River, Panama, June 5, 1911 (A. Busck) differs a little in color from the above. The scutellum has very little trace of golden pollinosity and the second tergite has a pair of elongate yellow spots.

Myiolepta transversa Hine evidently belongs to *Zonemyia*. It differs from *spinosa* principally in having patches of dense golden tomentum on the abdomen.

Genus **QUICHUANA** Knab.

Quichana Knab, Ins. Ins. Mens, I, 13, 1913.

Two species were included in this genus at the time of its erection: *sylvicola* Knab, genotype, and *picadoi* Knab and Knab further stated that *Mallota championi* Williston probably belonged here, too. Two additional species are at hand and a synoptic key is given for the group.

- A1. Arista much shorter than antenna; hind margins of second and third tergites yellow. (Peru).....*inca*, new species.
- A2. Arista as long as antenna; abdomen not bicolored.
- B1. Abdomen shining metallic bronze. (Mexico).....*championi* Williston.
- B2. Abdomen shining black.
- C1. Anterior margin of wing distinctly infuscated; no stigmatic crossvein. (Panama).....*calathea*, new species.
- C2. Anterior margin of the wing hyaline or nearly so; stigmatic crossvein present.
- D1. Face broader than length of arista. (Peru) ...*sylvicola* Knab.
- D2. Face a little narrower than length of arista. (Costa Rica).....*picadoi* Knab.

Quichana inca, new species.

Male.—Head broadly elliptical; ocellar triangle normal with rather long black pile; eyes contiguous; frons rather large with long black pile and with short yellow pile along eye margins; antenna elongate, slender, much longer than arista and width of face; second joint twice as long as first and nearly as long as second; face shining black with four narrow pollinose stripes extending down from antennae, the lateral ones extending to eye margins, the median ones to oral margin and thence to eye margin and turning upwards along the eye margins they meet the lateral stripes, thus forming an elongate pear-shaped outline; facial pile fairly long, pale; mesonotum dark, a pair of pale pollinose stripes, fading posteriorly; pile short and yellowish with longer black hairs intermixed; scutellum brownish, crescent-shaped, nearly three times as broad as long; femora

black, reddish brown apically; tibiae and tarsi reddish brown; hind femora greatly enlarged; abdomen chiefly black, narrow, slightly constricted subbasally; first tergite with matted yellow hairs; second and third tergites bordered behind with yellow pollinosity; wings infuscated anteriorly; stigmatal crossveins present; squamae darkly tinged, cilia brownish; halteres reddish brown. Length, 9 mm., wing, 7 mm.

Type-locality.—Huascaray, Peru. One male September 21 (C. H. T. Townsend).

Type.—Cat. No. 27829, U. S. N. M.

Quichana calathea, new species.

Male.—Orbits with yellow pile; ocellar triangle black pilose; frons with coarse bright yellow pile; antenna moderately elongate, slightly shorter than arista, third joint nearly as long as first two combined; arista longer than width of face; face whitish pollinose with fairly dense whitish pile; mesonotum dark with four whitish stripes; pile yellow, fairly long, a dense patch of yellow pile on notopleura which extends onto mesopleura; legs blackish to reddish brown; hind femur moderately enlarged; abdomen entirely shining black, broadest basally; clothed with yellow pile, mat-like on first tergite; wings with a large white spot apically, strongly infuscated anteriorly and basad of the white spot; stigmatal crossvein absent. Length: 10 mm., wing, 8.5 mm.

Female.—Front rather narrow; pile everywhere darker, apex of wing usually without white spot.

Type-locality.—Porto Bello, Panama.

Type.—Cat. No. 27830, U. S. N. M.

Ten specimens were reared from the water and material in the flower bracts of a large species of *Calathea*, August 28, 1923 (R. C. Shannon).

Mixogaster rarior, new species.

Male.—Head broader than its height by nearly the width of an eye, broadly elliptical; eyes widely separated, the front slightly widening upwards; distinctly longer than broad; a transverse impression midway of ocelli and antennae; a yellow spot behind ocelli and a yellow transverse stripe below ocelli; antennae dark brown, shorter than length of face; first joint as long as following two, the second about one-third of first; first joint slender, following two thickened; arista paler, a little longer than third joint; face bright yellow, clothed with scattered pile; nearly three times as high as broad, straight in profile with gentle slopes; a small shining black tubercle a short distance below antennae; dorsum of thorax dark brown bordered completely, except on anterior margin between humeri, by a yellow stripe which includes scutellum; pleurae yellowish; legs dark reddish brown, bases of tibiae yellow; abdomen greatly constricted basally, the third and fourth segments of normal width, dark reddish brown color, paler on basal two-thirds and post margin of second and post margin of third tergites; wings infuscated anteriorly; a spur extending upwards from tip of fifth vein into first posterior cell; apical crossvein twice angulated, and with spurs at each angle also at the base of apical crossvein (four spurs in all). Length, 9 mm., wing, 6 mm.

Female.—Front and vertex subquadrate, a little longer than broad; length, 11 mm., wing, 9.5 mm.

Type-locality.—Taboga Island, Panama.

Type.—Cat. No. 27831, U. S. N. M.

Holotype male, paratype male, February 23; allotype female, February 26, 1924 (A. Busck).

Mixogaster dimidiata Giglis-Tos (Mexico) is apparently the closest related species to the above but it is distinguished by its extraordinary arcuate face. *M. mexicana* also is closely allied. It may be distinguished by its yellow antennae and lack of yellow lateral mesonotal border.

***Mixogaster rarior rarissimus*, new variety.**

Male.—Differs from the male of the above by its larger size, 11 mm., vertex behind ocelli uniformly reddish brown; a median brownish stripe extending from oral margin to faint tubercle below antennae; only the spur at the tip of the fifth vein present.

Type-locality.—Cacao Trece Aguas, Alta Vera Paz, Guatemala, March 28, 1906 (Schwarz & Barber).

Type.—Cat. No. 27832, U. S. N. M.

***Microdon micromidas*, new species.**

Female.—Small species of a general yellowish appearance. Head as broad as high; ocellar triangle protuberant; front black, with scant bright yellow appressed pile; front narrowed somewhat above; antennae yellowish brown, shorter than face, first joint twice as long as broad, the second much smaller than the first, the third nearly three times as long as first; face yellowish, narrowing below, evenly clothed with bright yellow pile; dorsum of thorax noticeably smaller than frontal aspect of head, brassy black, with golden pile; pleurae dark with yellow pile; legs bright yellow, the hind legs with the apical half and first two tarsal joints black and with black pile; abdomen yellow with diffuse dark markings at the middle, clothed with yellow pile; wings with a distinct yellowish tinge, darkened apically.

Type-locality.—Taboga Island, Panama, February 21, 1911 (A. Busck).

Type.—Cat. No. 27833, U. S. N. M.

This species is closely related to *Microdon wheeleri* Mann which differs by having the first antennal joint as long as the third; a broad median stripe of the face shining and bare; dorsum of thorax larger than frontal aspect of head and nearly entirely yellow in color with a transverse band of black pile behind suture; legs entirely yellow (apical half of hind tibia and tarsi with black pile).

Micromidas shows several strong points of relationship with *Microdon* (*Masarygus*) *megacephalus* chiefly in the large head and small thorax and color and pilosity of the hind legs. Perhaps the three species discussed here will eventually be shown to be a closely related group.

THE HISTORY OF THE RYNCHOPHORID GENERA RYNCHOPHORUS, CALENDRA, SPENOPHORUS AND SITOPHILUS (COLEOPTERA).

BY W. DWIGHT PIERCE, *Banning, California.*

I have been asked by Mr. A. F. Satterthwait to elucidate in full my studies of the genotypes of the important genera of the grain weevils, and the corn root weevils. The following notes are extracted from my manuscript on the generic nomenclature of the Rhynchophora, which is based on personal study of practically all the original publications in the group.

I will trace step by step the citations which may have a direct bearing on type fixation in the genera concerned.

CURCULIO Linnaeus, 1758, Syst. Nat., 10th edit., pp. 377-386. Includes 80 species, no type designated. First valid designation of type by Latreille, 1810, = *nucum* Linnaeus. *Balaninus* Germar, 1817, is an isogenotype. This genus had as its first three species *palmarum*, *indus*, and *hemipterus*.

RYNCHOPHORUS Herbst, 1795, Der Käfer, vol. 6, pp. 3-429. Includes 22 species, no type designated. First designation of type by Schönherr, 1826, = *palmarum* Linnaeus.

CORDYLE Thunberg, 1797, Kongl.—Vet. Ac. Handl., vol. 18, pp. 44-49. Includes 5 species, no type designated. The first species was *palmarum* Linnaeus, and is hereby designated as type, making Cordyle an isogenotype of *Rynchophorus*.

RHYNCHOPHORUS Illiger, 1798, Verz. Käf. Preuss., pp. 497-510. Equals *Rynchophorus* Herbst, 1795.

CALENDRA Clairville-Schellenberg, 1798, Ent. Helv., pp. 62, 63. Includes 2 species, no type designated. First designation of type by Latreille, 1810, = *abbreviata* Fabricius. *Sphenophorus* Schönherr, 1838, is an isogenotype.

CALANDRA Clairville-Schellenberg, 1798, Ent. Helv., plate 2. Equals *Calendra* Clairville-Schellenberg, 1798.

CALANDRA Fabricius, 1801, Syst. Eleuth., vol. 2, pp. 429-438. Equals *Calendra* Clairville-Schellenberg, 1798.

CURCULIO Latreille, 1810, Consid. Gen. Type designation = *nucum*, (Fabricius) Linnaeus.

CALANDRA Latreille, 1810, Consid. Gen. Type designation = *abbreviata* Fabricius. Equals *Calendra* Clairville-Schellenberg, 1798.

CALANDRA Leach, 1815, Edinb. Encyc., vol. 9, Entom., pp. 106-109. Type designation = *granaria* Linnaeus. Equals *Sitophilus* Schönherr, 1838.

CALANDRA Say, 1824, Amer. Ent. Equals *Calendra* Clairville-Schellenberg, 1798.

RHYNCHOPHORUS Schönherr, 1826, Curc. Disp. Meth., pp. 23, 326. Type designation = *palmarum* (auct.) Linnaeus. Equals *Rynchophorus* Herbst, 1795.

CALANDRA Schönherr, 1826, Curc. Disp. Meth., pp. 23, 328. Type designation = *granaria* (auct.) Linnaeus. Equals *Sitophilus* Schönherr, 1838.

SPHENOPHORUS Schönherr, 1838, Gen. et Sp. Curc., vol. 4, pt. 2, p. 875.

Type designation = *abbreviata* Fabricius. Equals *Calendra* Clairville-Schellenberg, 1798.

SITOPHILUS Schönherr, 1838, Gen. et Sp. Curc., vol. 4, pt. 2, p. 968.
Type designation = *oryzae* Linnaeus.¹

The synonymy given above may be expressed briefly as follows:

- CURCULIO* Linnaeus, 1758, Syst. Nat., 10th edit., pp. 377-386.
type—*nucum* Linnaeus, designated by Latreille, 1810.
- BALANINUS* Germar, 1817, Mag. der Ent., pp. 339-341.
type—*nucum* Linnaeus, designated by Leach, 1819.
- RYNCHOPHORUS* Herbst, 1795, Der Käfer, vol. 6, pp. 3-429.
type—*palmarum* Linnaeus, designated by Schönherr, 1826.
- CORDYLE* Thunberg, 1797, Kongl. Vet. Ac. Handl., vol. 18, pp. 44-49.
type—*palmarum* Linnaeus, hereby designated.
- RHYNCHOPHORUS* Illiger, 1798, Verz. Käf. Preuss., pp. 497-510.
type—*palmarum* Linnaeus, designated by Schönherr, 1826.
- CALENDRA* Clairville-Schellenberg, 1798, Ent. Helv., pp. 62, 63.
type—*abbreviata* Fabricius, designated by Latreille, 1810.
- CALANDRA* Clairville-Schellenberg, 1798, Ent. Helv., plate 2.
type—*abbreviata* Fabricius, designated by Latreille, 1810.
- SPHENOPHORUS* Schönherr, 1838, Gen. et Sp. Curc., vol. 4, pt. 2, p. 875.
type—*abbreviata* Fabricius, designated by Schönherr, 1838.
- SITOPHILUS* Schönherr, 1838, Gen. et Sp. Curc., vol. 4, pt. 2, p. 968.
type—*oryzae* Linnaeus, designated by Schönherr, 1838.
- CALANDRA* Leach, 1815, Edinb. Encyc., vol. 9, Entom., pp. 106-109.
type—*granaria* Linnaeus, designated by Leach, 1815.

¹My attention has just been called to a point in Schönherr's work that I seem to have overlooked in my studies. It seems that Schönherr (1826, Curc. Diep. Meth. pt. 4, preface p. V) preferred to change all feminine genonyms into masculine form, and that when he proposed *Sitophilus* he intended to substitute this name for *Calandra* as he interpreted that name. We might truly consider it a pure substitution and consider his genus *Sitophilus* a pure genotypic synonym of his 1826 conception of *Calandra* if he had named the same species as his type of *Sitophilus*; but he did not do this. Instead he named another species, now considered as congeneric, but which has a morphological character of such importance that in many families the two would be separated as distinct genera. This may never occur in this group; but because future entomologists may consider the presence or absence of wings of true generic character, it is best for us to abide by what Schönherr did, rather than what he intended to do.

DESCRIPTION OF A NEW SAWFLY INJURIOUS TO JACK PINE.

BY S. A. ROHWER, *U. S. Bureau of Entomology.*

The description of the species given below is published at this time so that the name may be available for use in a paper dealing with the life history and habits of the jack pine sawfly.

Neodiprion (Neodiprion) banksianae, new species.

Structurally this new species is very closely allied to *dyari* Rohwer but, besides certain details in sculpture and a somewhat different clypeus, it may be readily separated from *dyari* by the paler abdomen of the female and the ferruginous venter of the male. This species is also closely allied to *eximina* Rohwer, but it may be distinguished from that species by the narrower and broader postocellar area, the more finely punctured prescutum, more sparsely punctured mesepisternum, and the pale tergum.

Female.—Length 7 mm. Clypeus convex, covered with rather large irregular punctures, the apical margin slightly emarginate and narrowly depressed; middle fovea large, somewhat circular in outline, rather deep; frons coarsely, irregularly punctured; vertex and posterior orbits shining, with large scattered punctures; postocellar area convex, three times as wide as its anterior width, not depressed medianly; antenna 19-jointed, the third joint slightly longer than the fourth, the rami about equal to the length of the joints; scutum and prescutum polished but with small, separate, distinct punctures; scutellum sharply angulate anteriorly, almost truncated posteriorly, the sides with large distinct punctures; mesepisternum shining, dorsally with distinct separated punctures; tarsi normal; hind basitarsus distinctly longer than its apical width; tergites polished; sheath when seen from below with the apical margin rounded, the pad-like brush elongate and separated from the median ridge by a distance greater than one-half its width, the length of the pad subequal with the basal portion of the ridges supporting them. Ferruginous, testaceous and black; head ferruginous; frons from the bases of the antennae up to and including the ocelli (making a broad U), the vertical furrows and antennae black; prescutum except testaceous lateral margins, scutum and metanotum, black; pronotum, pleurae, base of the venter and sides of the tergites, testaceous; abdomen, except where mentioned, pale, ferruginous; coxae, trochanters, bases of tibiae testaceous; femora except the black basal part of the anterior pair, apices of tibiae and tarsi ferruginous; wings hyaline; venation dark brown, costa testaceous.

Paratype females vary in the amount of black on the frons and in some of them the U-shaped black mark is broken so as to be only a transverse black band around the ocelli and irregular spots at the bases of the antennae. In some paratypes, the posterior median portion of the scutellum is punctured, but in none of the specimens is the scutellum punctured in the anterior median portion.

Male.—Length 5.5 mm. Clypeus convex the surface with large well defined punctures, the apical margin gently arcuately emarginate and very narrowly depressed; head with large punctures which are irregularly confluent on the

frons; postocellar area not sharply defined laterally, distinctly convex; antennae 20-jointed; pronotum irregularly punctured; scutum and prescutum shining, with separate small punctures; scutellum with large close punctures which are irregularly confluent laterally; mesepisternum coarsely irregularly punctured dorsally, ventrally shining and with small scattered punctures; two basal tergites with a few large scattered punctures, remaining tergites polished; hypandrium with the apical margin broadly rounded, the surface with distinct scattered punctures. Black; clypeus, ventral aspect of tergites and all the sternites ferruginous; labrum and tegulae testaceous; apices of coxae, trochanters, base of the four anterior tibiae and four anterior tarsi, testaceous; femora, apices of the four anterior tibiae, all of the posterior tibiae and the posterior tarsi, ferruginous.

Type-locality.—Itasca Park, Minnesota.

Paratype-locality.—Osage, Minnesota.

Described from three (one type) females and two (one allotype) males from the type locality and from seven females and five males from the paratype locality. This material was reared from larvae feeding on *Pinus banksiana* by S. A. Graham and is recorded under Bureau of Entomology Nos. Hopkins U. S. 17501 and 17500 and various sub-letters. The type is recorded under No. 17501-u and the allotype under 17501-v. All of the specimens emerged during September, 1924.

Type, allotype and paratypes.—Cat. No. 28104 U. S. N. M.

Two females and three male paratypes deposited in the collections of the University of Minnesota.

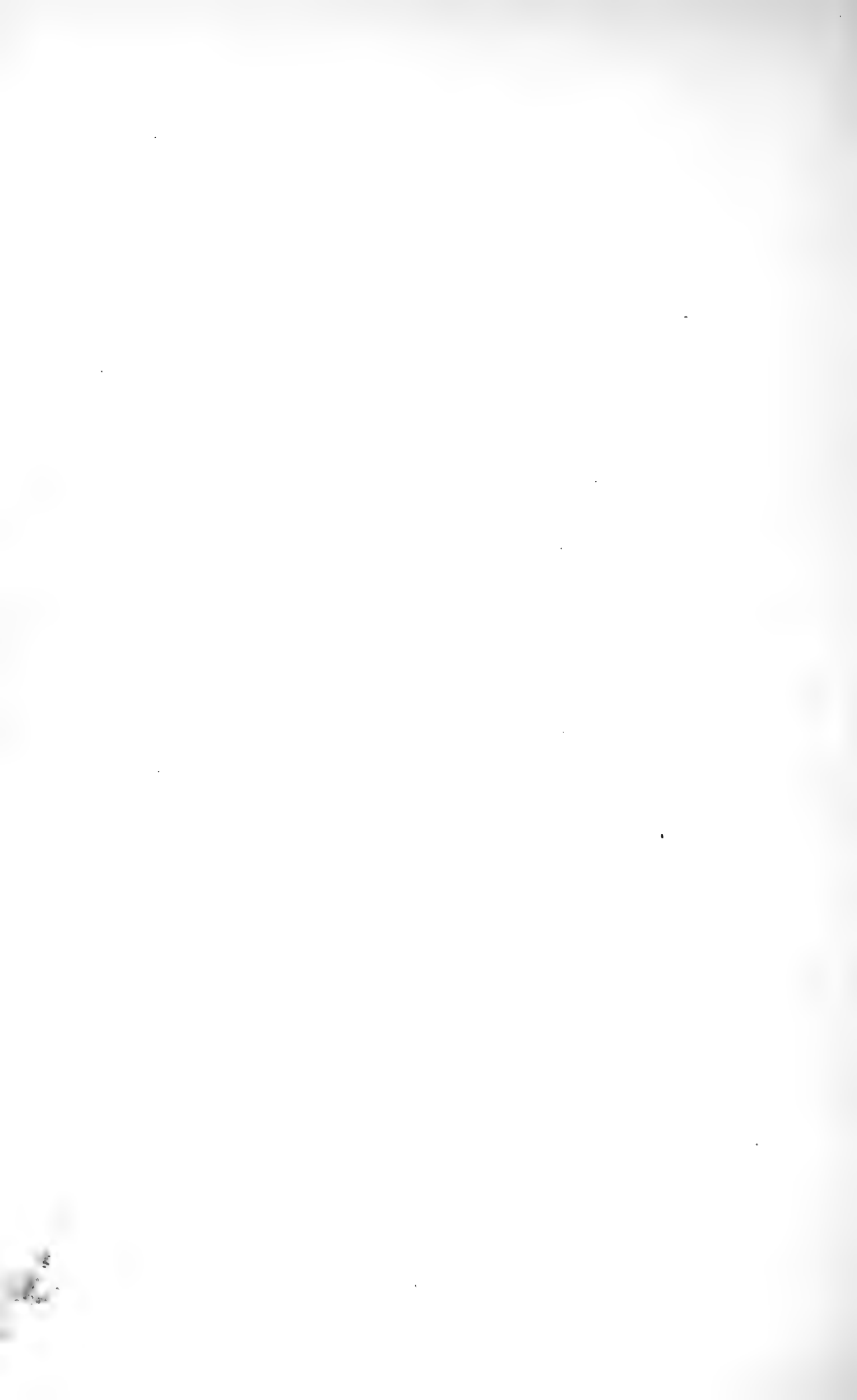
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EDITORIAL.

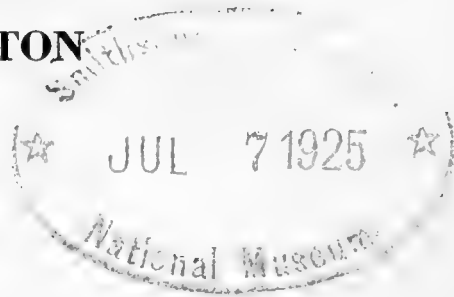
What are the chief requisites for a scientist? Obviously, the first is an insatiable curiosity concerning the workings of Nature; and the second, a tireless patience with small details. About the third Doctors will disagree. Some will hold for education; some for imagination; others for an acute reasoning faculty; and still others for certain *a priori* or, at least, *a posteriori* convictions. For my part, I contend that the third and most essential requisite—because it is a kind of saving grace—is a humorous and healthy scepticism, an ability to doubt against the loud voice of authority and the circumstantial evidence of the apparently obvious. Of course the scientist must have certain other qualifications—the practical virtues of industry, courage and docility, and the psychic virtues of faith, hope and vanity; but these he requires rather as a man than as a man of science, and these he shares with the common run of men. Faith, for example, is something we all have—and must have. Every one believes in something; if not in Santa Claus, then in the authority of professors, Natural Selection, Psychology, the evidence of plotted curves, statistics or the finality of his own inductions; and he believes with a sincerity that is at once simple and sublime. But in such belief a certain danger lies. It is too easy—and often too profitable—to believe. This is an age of faiths; and they are so many and all-sufficient, so insinuating, so well served by propaganda, so conveniently capsulated that one is apt to gulp them in almost unconsciously, to the ruin of his mental health. Nearly every belief held by normal beings contains some measure of truth, but none is altogether, or even substantially, true—as stated; and to swallow any of them whole, as many do, does not make for sound science, however much it may promote ethics or prosperity.

The scientist should never make a complete, unqualified act of faith—never surrender unconditionally to a theory or synthesis of facts. When he does he ceases to be a scientist, and is fit only for stratagems, reformism and the bureaucratic somnambulance of efficiency. He becomes a “practical” man. A “practical” man can not afford to doubt. A man of science can not afford not to. For him a reasonable minimum of doubt is always the incentive to look further, to examine anew, to reassert facts, to probe for contradictions, weaknesses, omissions,—in other words, to continue the laudible business of exploring the privacies of Nature. It is his *vis a tergo*. He is a scientist primarily because he is curious, and to satisfy that curiosity he must be laboriously patient; but he is curious chiefly because—in his secret, plasomic self—he is considerable of a sceptic.

—Carl Heinrich.



PROCEEDINGS
OF THE
ENTOMOLOGICAL SOCIETY
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No. 6

A SYNOPSIS OF NEW WORLD FLIES OF THE GENUS
SPHAEROCERA (DIPTERA: BORBORIDAE).

BY J. R. MALLOCH, *U. S. Biological Survey.*

In a recent paper on *Sphaerocera* and *Aptilotus* Spuler has made use of three subgenera, dividing them on the structure of the face and shape and armature of the scutellum.¹

Unfortunately lack of access to types of two previously described species has resulted in their being assigned to wrong subgenera. Those species are *annulicornis* and *pallipes*, both described by the writer. Neither of these species have the pair of large yellowish white spots on the dorsum of the abdomen, a character made use of by Spuler in separating the subgenera, but in most specimens of *annulicornis* there are indications of a spot on middle of at least two of the tergites.

I have before me several species not in the material available to Spuler and believe that further accessions of species in this genus will either necessitate the dropping of the subgeneric groups or force us to add several others. The first alternative is my choice. Excessive multiplication of genera and subgenera has become a fad with many present-day workers and conditions in this family are no better than in many others, to say the least. It may be that subsequent and more intensive investigations into the various stages of the members of this family will serve to validate some of these so-called subgenera but I very much doubt it.

The genus *Sphaerocera* is distinguished from its allies by the absence of long bristles on scutellum and pleura, the tuberculi-form elevation of the metapleura (not previously mentioned by any author) and the complete basal and anal cells of the wing. The basal segment of the hind tarsus is always longer than the second and much thicker.

There are several species of *Sphaerocera* in which there are distinct orbital bristles, contrary to Spuler's statement. It may be of interest to record also that there are two distinct weakened portions of the costal vein, one before and one just beyond the humeral vein, in addition to the break before apex of first vein. These weak parts of costa are present and distinct in most members of the family but in certain species of

¹Pan-Pacif. Ent., Vol. 1, No. 2, p. 66, 1924.

the genus *Borborus* the one beyond the humeral vein is hardly distinguishable.

I have taken *curvipes* Latreille and *pusilla* Fallen on carrion and manure, and the North American *annulicornis* Malloch on fungi, from which I also reared the species.

I give a key for the recognition of the known New World forms, only one of which I have not seen (*scabra* Spuler).

KEY TO SPECIES.

1. Scutellum without a complete series of short wart-like tubercles across hind margin, at most with one on each side.....2.
- Scutellum flattened above, hind margin subtransverse, furnished with a regular series of seven or more short wart-like tubercles; hind tibia with a curved apical ventral spur which is at least as long as diameter of tibia; upper margin of face along lower side of antennal foveae sharply carinate; abdominal sternites large and conspicuous in both sexes....10.
2. Abdomen without two large rounded whitish spots on dorsum, at most with a small whitish spot in middle of anterior margin of second and third visible tergites.....3.
- Abdomen with two large rounded whitish spots on dorsum which occupy about the apical third of first and second and the anterior third or more of second and third tergites, extending over about two-thirds of the entire disc from side to side, the spots apparently consisting of less heavily chitinized unpigmented integument.....7.
3. Hind tibia with a very strong curved apical ventral spur the tip of which lies against the anterior side of the basal segment of tarsus, the latter excavated at base below and with a series of flexed setulose hairs before the excavation the first one quite strong, claw-like; scutellum flattened above, hind margin almost exactly transverse.....*curvipes* Latreille.
- Hind tibia with or without an apical ventral spur, if this is present it is inconspicuous and the basal segment of hind tarsus not excavated basally and not armed as above; scutellum convex, hind margin not transverse.....4.
4. Face with a rounded transverse elevation below, which connects with a rather prominent rounded central vertical ridge extending upwards to base of antennae, the lower margin of antennal foveae not carinate nor distinctly differentiated; face, labrum, antennae, and legs yellow; second segment of hind tarsus as broad as long, not half as long as first.....*flaviceps*, new species.
- Face with lower central portion flattened, subtriangular, the margins along lower side of antennal foveae sharply carinate; face and labrum black; second segment of hind tarsus over twice as long as broad and over half as long as first except in *annulicornis*.....5.
5. Legs largely black, trochanters, extreme apices of femora, bases and apices of tibiae, and most of fore and mid tarsi yellowish; second segment of hind tarsus not twice as long as broad....*annulicornis* Malloch.
- Legs including coxae yellow; second segment of hind tarsus over twice as long as broad.....6.

6. Elevated lower portion of face forming a rather small triangle, the antennal foveae therefore very broad, allowing the antennae to droop quite conspicuously.....*flavicoxa*, new species.
- Elevated portion of face very large, the antennal foveae narrow, causing the antennae to be directed straight laterad.....*pallipes* Malloch.
7. Legs including fore coxae yellow, apices of femora, the tibiae, and tarsi more rufous or pale brownish; hind tibia with a short but stout black or fuscous spur at apex on anteroventral side; only two chitinous ventral plates in female abdomen.....*bimaculata* Williston.
- Legs largely fuscous, fore coxae black except at extreme apices; hind tibia without a distinguishable apical spur.....8.
8. Legs yellow, femora sharply bicolored, basal half black, apical half yellow, tips of hind pair more rufous or brownish; only two chitinous ventral plates in female.....*varipes*, new species.
- Legs more largely infuscated, all femora black, becoming yellowish at apices.....9.
9. Venter of female with two chitinous black plates, on first and fourth segments; cheeks closely striate in middle.....*striata*, new species.
- Venter of female with three chitinous black plates, on first, third, and fourth segments; cheeks not striate in middle.....*nigrifemur*, new species.
10. Legs entirely black; inner cross-vein distinctly before basal third of discal cell; scutellum with very strong marginal tubercles; notum with four distinct rows of tubercles; disc of scutellum tuberculate; front with two divergent rows of minute tubercles.....*scabra* Spuler.
- Legs varying from almost entirely yellow to black, with coxae, trochanters and knees yellow; notum without distinct tuberculate rows; marginal tubercles on scutellum less pronounced; inner cross-vein at or slightly beyond basal third of discal cell.....*pusilla* Fallen.

N. B.—The characters under caption 10 are copied from Spuler's Key as I do not have specimens of *scabra*.

Sphaerocera curvipes Latreille.

A common species in Europe and North America and the largest of the genus known from this country, averaging about 4 mm. in length. The second costal division is less than three times as long as third, and despite Spuler's statement the scutellum is not smooth on dorsum but has short stubby spines that look wart-like under a high power lens, and on each postero-lateral angle there is at least one stout short spine that resembles a short tubercle.

This is the species usually referred to as *subsultans* Fabricius, but the latter is not a member of this family, being the same as *Hypocera mordellaria* Fallen according to those who have examined the type specimen.

Recorded from Washington, California, Illinois, Missouri, Pennsylvania, Vermont, Massachusetts, District of Columbia, and New Jersey.

Sphaerocera flaviceps, new species.

Male and Female.—Black, shining, antennae, face, labrum, most of proboscis, legs, and halteres yellow.

Face transversely roundly elevated on lower half, the swelling connecting with a rounded vertical ridge descending from bases of antennae; each frontal orbit with two short outwardly curved black bristles; vibrissal angle with two black bristles; labrum not as high as width of third antennal segment. Scutellum more flattened on disc than in *bimaculata* and its closest allies, but not so flat as in *curvipes*, hind margin very broadly rounded, the pair of tubercles very small. Fourth visible tergite in male very short, hypopygium large, bulbous. Fore and hind femora swollen in both sexes, less noticeably so in female; hind tibia with three short fine black apical bristles; second segment of hind tarsus not longer than broad and not over half as long as first. Second costal division not three times as long as third; fifth vein not reaching margin of wing.

Length, 2.5 mm.

Habitat.—Type, male, and allotype, Higuito, San Mateo, Costa Rica (P. Schild).

Type.—Cat. No. 27694, U. S. N. M.

This species does not fit well into any of the subgenera accepted by Spuler but has affinities more with *curvipes* than with any of the other species.

Sphaerocera annulicornis Malloch.

A common species in the eastern United States, distinguished readily from its allies by the characters listed in the key.

Originally described from Massachusetts, the type being in the National Museum. I have before me specimens from Plummer's Island, Maryland, September 15, 1907 (A. K. Fisher, W. L. McAtee), and August 27, 1922, reared from fungus under a stone (J. R. Malloch); Chain Bridge, Virginia, September 4, 11, and 18, 1922 (J. R. Malloch); Maywood, Virginia, January 2, 1916 (W. L. McAtee); Glen Echo, Maryland, August 21, 1921 (J. R. Malloch); and Rock Creek, District of Columbia, November 4, 1924 (H. S. Barber).

Sphaerocera flavicoxa, new species.

Male and female.—Black, shining, antennae, palpi, part of proboscis, legs including coxae, and the halteres yellow. Abdomen with a small white area at base of third visible tergite. Wings clear.

Each orbit with two very short black outwardly curved bristles on upper half, interfrontalia bare; cheek glossy and smooth in center; facial triangle small, sides subequal, upper margins slightly carinate, approaching lower margin within half the width of third antennal segment in vertical line with base of latter so that the antennal foveae are very much widened from inner to outer extremities; labrum not as high as width of third antennal segment; only one bristle on vibrissal angle, the usual hairs subobsolete, sometimes one notice-

able. Mesonotum with 4 series of microscopic decumbent hairs which are very difficult to distinguish even under a very high power; scutellum convex, almost evenly rounded on margin, and with a very minute marginal wart on each side about midway from middle to base. Abdomen in female with three small round chitinized ventral plates besides the large one on fourth visible tergite. Basal segment of hind tarsus not as long as next two combined, second about three times as long as wide; hind tibia with three short apical bristles, less distinct in the male. Anal cell exceeding length of basal by about length of the vein closing latter; fourth vein slightly curved forward, the cell in front of it narrower at apex than at middle; second costal division about four times as long as third.

Length, 2-2.5 mm.

Habitat.—Type, male, allotype, and 19 paratypes, Higuito, San Mateo, Costa Rica (P. Schild); two paratypes Petropolis, Brazil (P. Borgmeier).

Type.—Cat. No. 27693, U. S. N. M.

Sphaerocera pallipes Malloch.

I have reexamined the type specimen of this species which is in the National Museum. The face is sharply carinate along the lower margin of facial foveae and these are much higher on the face than in the preceding species which it resembles quite closely. This species fits very well into the group *bimaculata* except for the lack of dorsal abdominal spots, while the preceding one is more clearly intermediate between that group and *curvipes*.

Originally described from Panama. I have seen a very large series of both sexes of this species collected in the Panama Canal Zone in July, 1923, by R. C. Shannon and now in the National Museum. In some specimens there is a slight reddish darkening of the tips of femora as is the rule in *bimaculata*.

Sphaerocera bimaculata Williston.

I have not seen the type of this species but assign to it the form in which the legs are entirely yellow with but a slight rufous or brownish tinge on certain parts.

Originally described from St. Vincent. Spuler records it from Florida, Trinidad, and Costa Rica. I have seen specimens from Cordoba, Mexico, and Higuito, San Mateo, Costa Rica. I have seen no Florida specimens of this species, the most closely related form from that State available to me being *striata* described in this paper.

Sphaerocera varipes, new species.

Female.—The outstanding characters distinguishing this species from *bimaculata* lie in the color of the legs and absence of a black, stout, hind tibial spur

as stated in the key. The color of the femora is very distinctive, and in some specimens which have the apical part of hind femora blackened they present the appearance of having a yellow preapical band very different from that of any other species. The face is similar to that of *bimaculata*, the tubercle on each side of scutellar margin is quite noticeable in some specimens, less obvious in others. The first posterior cell of wing is narrowed a little apically in both species and the discal cell is widened at inner cross-vein, causing the latter to be very short, and even in some cases the second and third veins are fused for a short distance at this point.

Length, 2-2.5 mm.

Habitat.—Type and 4 paratypes, Higuito, San Mateo, Costa Rica (P. Schild).

Type.—Cat. No. 27697, U. S. N. M.

***Sphaerocera striata*, new species.**

Female.—Differs from the preceding species in having the femora black, becoming yellowish at tips, and the tibiae brownish in middle. The cheeks are microscopically striate and glossy in center, and the scutellum has the central part between the tubercles quite noticeably produced, giving it a triangular appearance, while the tubercles are set on slight elevations that are quite obvious from above. In all four species with dorsal pale spots on abdomen the second costal division is about four times as long as third, or even longer.

Length, 2.5 mm.

Habitat.—Holotype, Fort Landerdale, Florida, February 19, 1919 (A. Wetmore).

Type.—Cat. No. 27695, U. S. N. M.

***Sphaerocera nigrifemur*, new species.**

Female.—A darker species than last, the pale parts of legs more brownish and not so extensive. Center of cheeks granulose. Scutellum rather evenly rounded, the tubercles very small. Basal segment of hind tarsus a little longer than in last species, slightly longer than next two segments combined.

Length, 2.5 mm.

Habitat.—Holotype, Glen Echo, Maryland, August 28, 1921 (J. R. Malloch).

Type.—Cat. No. 27696, U. S. N. M.

***Sphaerocera scabra* Spuler.**

I have not seen this species but judging from the description it ought to be easily distinguished from *pusilla*.

Known only from South Bend, Washington.

***Sphaerocera pusilla* Fallen.**

I have seen several specimens from this country which appear to belong to this species. In my personal collection there are examples of *nitida* Duda, *parapusilla* Duda, and *pusilla* Fallen.

These three species are extremely difficult to distinguish from each other and the specimens from North America which I refer to above differ from all of these about as much as any of these do from each other. Very careful comparisons of numbers of specimens are essential to determine the status of these species.

Spuler records *pusilla* from Washington, Idaho, British Columbia, Massachusetts, Illinois, and District of Columbia. I have seen specimens from Illinois and Virginia.

NOTES AND NEW SPECIES (LEPIDOPTERA).

BY WM. BARNES AND F. H. BENJAMIN, *Decatur, Illinois.*

Citheronia splendens Druce.

Eacles splendens Druce, Biol. Centr.-Amer., Lep., Het., 1886, Vol. 1, p. 169, pl. XV, f. 12 (type); Biol. Centr.-Amer., Lep., Het., 1897, Vol. 2, p. 413, pl. LXXIX, f. 11.

Citheronia splendens Packard, Mono. Bomb. Moths, Part 2, 1905, p. 138, pl. XVIII, ff. 2-2a; pl. XV, f. 1 (larva); pl. LV, ff. 1-1b (larval charac.).

Mr. O. C. Poling caught some examples of this species and reared others in the Baboquivari Mountains, Pima Co., Arizona.

In order to be sure that the U. S. specimens in no way differed from Mexican material we sent a specimen to Dr. Schaus who kindly compared it.

Cisthene (Ozodania) juanita, new species.¹

Head, palpi, tegulae, and thorax black; patagia black edged dorsomesially with crimson; abdomen crimson. Fore wing: ground color dull black, untinged by brown or grey; inner margin broadly edged with orange-yellow; an elongated red-orange spot on costa. Hind wing: ground color crimson; with a black apical patch extending to vein 2. Beneath: much as above, the markings on the fore wing tinged with scarlet and somewhat larger.

Expanse.—19 mm.

Distinct from all described U. S. species of the subgenus *Ozodania* by the possession of a black head. Apparently not like any described neotropical species although closer to the Mexican *phaeoceps* than to any other known to us. Dr. Schaus reported inability to match the type with Mexican material.

¹Barnes & Lindsey have shown (Ann. Ent. Soc. Am., 1922, Vol. XV, p. 98) that *Eudesmia* Hbn., type *ruficollis* Hbn., has priority over *Cisthene* as used by Hampson; while *Cisthene* Wlk., type *subjecta*, as fixed by Grote, 1874, and Kirby, 1892, has priority over *Illice* Wlk. *C. picta* B. & McD. forms a good connecting link between *Ozodania* and *Cisthene*. As these are merely separated by a secondary sexual character, and because of the presence of an intermediate, we use *Ozodania* in a subgeneric sense.

Type locality.—Baboquivari Mts., Pima Co., Arizona.

Type.—Holotype ♂, 15–30 Aug., 1924 (O. C. Poling), in Barnes Collection.

***Cerastis lobato* Barnes.**

Pseudoglaea lobata Barnes, Can. Ent., 1904, Vol. 36, p. 237.—Barnes & McDunnough, Contr. N. H. Lep. N. A., 1912, Vol. 1 (4), p. 11, pl. IV, f. 1 (type ♂).

Agrotis hahama Dyar, Ins. Insc. Menst., 1919, Vol. 7, p. 74.

Professor M. Draudt has called this synonymy to our attention, and a specimen compared with the type of *lobato* was sent to Dr. Schaus for comparison with the type of *hahama*.

The species is not common in collections, the National Museum only possessing the type of *hahama*, while until last year the type of *lobato* was the only specimen in the Barnes Collection. Recently another specimen was received, followed by two more, so that the Barnes Collection now possesses four examples. These tend to show the species to be somewhat variable in color and maculation.

The type of *hahama* came from Zacualpan, Mexico; the type of *lobato* from the Chiricahua Mts., Arizona. Other Arizona records are Palmerlee and Hereford, Cochise County. Draudt states that he has "some ♂♂ and a ♀" from Mexico, so that in all probability the species is really a neotropical one reaching its northern limit in Southern Arizona.

Dr. Dyar's placement in *Agrotis* caused us to examine the fore tibiae. These are heavily spined, so that, following Hampson's keys the species would fall into the genus "*Agrotis*."

The species is, however, so closely allied in all other characters and habitus with *olivata* that we immediately began to examine that species to try to find spines. There are weak spines on the fore tibiae of at least some specimens of *olivata*, other specimens apparently did not possess the spines or had lost them. While there has been a reduction of tibial armature on the fore legs of *olivata* there has been a decided strengthening of tarsal armature; the fore metatarsus ending in a long curved claw, with other spines strengthened, claw-like, indicative that *Pseudoglaea* Grt., type *blanda*, may have to be resurrected for *olivata*.

Examination of a European specimen of *oxalina* showed a small spine on the fore tibia, but the tarsi possessed only the ordinary armature of spines.

Were this the only case where the presence or absence of spines appeared of little or no generic value, we would be tempted to place *olivata*, *lobato* and *oxalina* in separate genera, which would seem a logical course, but we have in mind the case of *Sidemia devastator* Brace, some specimens of which

possess a spine on the hind tibia and would therefore key to *Protagrotis*, and the case of *speciosa* Hbn., some specimens of which possess spines on the fore tibiae and others lacking them, a fact which has already been discussed in detail by Dr. McDunnough in Canadian Entomologist. Also *Trichorthosia spinosa* B. & McD. possesses spines on the fore tibiae.

We are therefore inclined to temporarily place more stress on the Glaea-like habitus of the species Hampson places in "*Mythimna*" than in the presence or absence of spines on the fore tibiae.

The proper generic name to use for these insects is also questionable. *Mythimna* has as type *albipuncta*, designated by Duponchel, 1829, and is obviously incorrect. *Orthosia* takes as type *instabilis* designated by Curtis, 1828, so that *Cerastis* Ochs., type *rubricosa*, appears to be the oldest available generic name. A thorough revision of the genera allied to *Agrotis* will probably be necessary before any stability of nomenclature can obtain. We might here again mention that *Agrotis* is a Tentamen genus, taking as type *segetum*. We have not as yet determined what genus to use instead of *Agrotis* as used by Hampson, but *Triphaena* Hbn., type *pronuba*, designated by Duponchel, 1829, will probably eventually be substituted. We have already called attention to the fact that *Noctua* falls to *Phalaena*, both taking as type, under the present code, *typica*.

Morrisonia diplogramma Schaus.

- Himella diplogramma* Schaus, Jour. N. Y. Ent. Soc., 1903, Vol. 11, p. 232.
Eriopyga diplogramma Hampson, Cat. Lep. Phal. B. M., 1905, Vol. 5, p. 305 (ignot.), pl. LXXXVII, f. 7 (type).
Morrisonia albidior Barnes & McDunnough, Journ. N. Y. Ent. Soc., 1910, Vol. 18, p. 153; Contr. N. H. Lep. N. A., 1912, Vol. 1 (4), p. 31, pl. IX, f. 4 (type ♀).
Scriptania inquisita Dyar, Ins. Insc. Menst., 1919, Vol. 7, p. 164.

Professor Draudt called our attention to this synonymy. As a check against possible error, a specimen compared with the type of *albidior* was submitted to Mr. Schaus for comparison with the types of *diplogramma* and *inquisita*. We are not at all sure of the generic placement, never having seen a specimen with the abdomen unrubbed. We temporarily retain the species in *Morrisonia* as placed by Barnes & McDunnough, the vestiture surrounding the eyes being similar to species of that genus.

Homohadena loculosa Grote.

- Perigea loculosa* Grote, Pap., 1881, Vol. 1, p. 154.—Smith, Bull. U. S. N. M., 1893, Vol. 44, p. 154.
Homohadena loculosa Hampson, Cat. Lep. Phal. B. M., 1906, Vol. 6, p. 190, pl. CI, f. 5.—Barnes & McDunnough, Contr. N. H. Lep. N. A., 1913, Vol. 2 (1), p. 24, pl. XI, f. 15.

Bryomima continentis Dyar (♂), Proc. U. S. N. M., 1917, Vol. 51, p. 11.

Bryomima oziphona Dyar (♀), Proc. U. S. N. M., 1917, Vol. 51, p. 11.

Professor Draudt called to our attention that *continentis* was probably a synonym of *loculosa*. Knowing the species to be somewhat sexually dimorphic we sent both sexes to Dr. Schaus for comparison with the type of *continentis* and any other neotropical species which might be involved. We are informed that the female agrees with the type of *oziphona*.

Phobolosia duomaculata, new species.

Fore wing ground color olivaceous-grey, more or less tinged with luteous-brown, and covered with dense metallic strigae; t.a. and t.p. lines blackish, distally marked with white, the former waved, the latter excurved around cell; a large black rounded "reniform" at end of cell connected to a somewhat smaller black "subreniform"; s.t. line white, waved; a terminal row of black dots; fringe dusky. Hind wing: ground color variable, grey, more or less whitish basally; blackish discal dot present or absent; a terminal row of black dots; fringe grey, somewhat checkered with white. Beneath: whitish, more or less marked with black, a discal dot on each wing.

Expanse.—♂, 13–14.5 mm.; ♀ 16 mm.

Allied to *brimleyana* Dyar and *grandimacula* Schaus, but easily distinguished from both by the possession of the "subreniform." *P. grandimacula* is a neotropical species not known from the United States. *P. brimleyana* was described from a single female from North Carolina. The Barnes Collection possesses it from St. Petersburg, Florida, February, March, July, October, December, and Cedar Bluff, Mississippi, May (Benjamin). We are indebted to Dr. Schaus for a specimen of *grandimacula*, which has enabled us to compare these species, and for the information that the Texas species is unknown to him from the Neotropics.

Type localities and number and sexes of types.—Holotype ♂, San Benito, 16–23 June; allotype ♀, Brownsville, no date; 1 ♂ paratype, San Benito, 16–23 June; 2 ♂, 1 ♀ paratypes, Brownsville, no date.

Types.—In Barnes Collection; 1 ♂ paratype, in U. S. N. M.

OBRIMA Walker.

Obrima pyraloides Walker, Cat. Lep. Het. B. M., 1856, Vol. 9, p. 135 (*pyraloides* sole species and therefore type).

Obrima pimaensis, new species.

Palpi reddish brown. Head, thorax, and abdomen pale ochreous more or less tinged with olivaceous. Fore wing: ground color pale ochreous more or less tinged with olivaceous and dusted with obsolescent brownish scales; t.a. line olivaceous, irregular, more or less obsolescent; orbicular present or absent,

when present as a black point only; median line pale, nearly erect through cell, thence inwardly oblique to submedian fold, thence outwardly oblique to inner margin; reniform diffuse, indeterminate, darkening the edge of the median line in the cell; distal half of the median space more or less occupied by darker clouding; t.p. line absent; s.t. line pale, bordered by dark cloudings, irregular, angulate; terminal row of dark dots on veins present or absent; fringe practically concolorous. Hind wing pale yellowish, distally darker; a terminal row of dots present or absent; fringe pale. Beneath: pale creamy-ochre, more or less tinged with brownish; discal dots usually absent.

Expanse.—39–44 mm.

Closely allied to *rinconada* Schaus (Trans. Am. Ent. Soc., 1894, Vol. 21, p. 240) and very probably only a more northern race of that species. We are indebted to Dr. Schaus for the loan of a topotypical specimen of *rinconada* compared with type, and for the information that the tropical specimens before him are consistently darker with more pronounced black irrorations on the primaries.

Type locality.—Baboquivari Mts., Pima Co., Arizona, elevation approximately 5,000 ft.

Number and sexes of types.—Holotype ♂ and 5 ♂ paratypes, 15–30 June, 1923, O. C. Poling Coll.

Types.—In Barnes Collection; paratype in U. S. N. M.

***Aglossa gigantalis*, new species.**

Fore wing: ground color blackish shaded with yellow; all markings yellow; inner line marked on costa, else obsolescent; a yellow discal spot with a black central dot; outer line broad on costa, narrow below, strongly excurved and denticulate; five yellow dots on costa between the inner lines; fringe blackish. Hind wing: ground color fuscous-grey; median shades of darker-grey and yellowish-grey forming a diffuse double line nearly parallel to the outer margin; a narrow blackish outer line; fringe slightly paler than the wing but broadly interlined and appearing nearly concolorous. Beneath: fore wing fuscous, with yellow costal markings as above, except that the inner line is not indicated; hind wing yellowish, with a black medial line, and a black outer line.

Expanse.—38 mm.

The large size of the present species, as well as the peculiar markings distinguish it from all other U. S. species. Dr. Schaus informs us that these same characters distinguish it from any neotropical species known to him.

Type locality.—Baboquivari Mts., Pima Co., Arizona.

Type.—Holotype ♀, 15–30 June, 1924 (O. C. Poling), in Barnes Collection.

***Lepidomys nevalis*, new species.**

Sexes similar. Head and palpi greenish-white. Thorax bright pale purple more or less marked by green especially on the patagia. Abdomen cream color.

Fore wing: ground color bright green on fresh specimens, olive green on old specimens, an inner pure white, transverse line, from two-fifths out on costa, to one-fifth out on inner margin; a similar, parallel, outer line from near apex; fringe pure white. Hind wing and fringe pure white except for a slightly soiled appearance along outer margin in some specimens. Beneath: whitish, the fore wing tinged with green and showing the transverse white lines of the upper side.

Expanse.—21–24 mm.

Related to *viridalis* B. & McD. and *obliquata* Hy. Edw. and apparently replacing these in Southern Nevada and the similar regions of Northern Arizona and Western California. It is easily distinguished from the former by the oblique nature of the transverse bands, and from the latter because of the possession of two bands on each fore wing. These three species form a group not strictly congeneric with *irrenosa* Guenée,¹ the type of *Lepidomys*, which is a sexually dimorphic species. According to Sir George Hampson, *Lepidomys irrenosa* Gn. has priority over *Chalinitis olealis* Ragonot.

Dr. Schaus informs us that the species is unknown to him, either from the Neotropics or elsewhere.

Type localities and number and sexes of types.—Holotype ♂, 24–30 April; allotype ♀, 16–23 April; paratypes, 12 ♂♂, 16–23 April; 5 ♂♂, 24–30 April; 3 ♂♂, 16–23 May; 5 ♀♀, 16–23 April; 1 ♀, 24–30 April; 5 ♀♀, 16–23 May; all Clark Co., Nevada; 1 ♂, 1–15 July, 1921; Charlestown Mts., Southern Nevada; 5 ♂♂, 1–7 April; 2 ♂♂, 8–15 April; 1 ♂, 16–23 May; 1 ♂, 24–30 May; 2 ♀♀, 1–7 April; 2 ♀♀, 8–15 April; all San Bernadino Co., Calif.; 1 ♀, April, Walters Station, California; 2 ♀♀, no data; 4 ♂♂, April; 36 ♂♂, 1–7 May; 22 ♂♂, 8–15 May; 1 ♂, 8–15 June; 14 ♂♂, no date; 5 ♀♀, 1–7 May; 3 ♀♀, no date, all Mohave Co., Arizona; total 109 ♂♂, 27 ♀♀, mainly collected by O. C. Poling.

Types.—In Barnes Collection; paratypes in U. S. N. M. and Canadian National Collections.

¹A single specimen of a fourth species of the same group was collected by Mr. O. C. Poling, in the Baboquivari Mountains, Pima Co., Arizona. This was sent to Dr. Schaus for comparison with the Mexican material in the National Museum. Reply came, "I think this the male of *Anemosella basalis* Dyar described from female." The genus *Anemosella* Dyar was erected for the new species *basalis* Dyar from Zacualpan, Mexico, both genus and species described in Proc. U. S. N. M., 1915, Vol. 47, p. 399, *basalis* being sole species and designated type. More material is awaited before adding *basalis* to our lists, but in all probability the genus *Anemosella* will be available for *viridalis* B. & McD. *obliquata* Hy. Edw. (*albistrigalis* B. & McD.), and *nevalis* B. & Benj.

EPIPEROLA Dyar.

Genotype.—*Trabala drucei* Schaus.

Epiperola Dyar, Journ. N. Y. Ent. Soc., 1878, Vol. 6, p. 238 (*drucei* sole species and designated type); Proc. U. S. N. M., 1906, Vol. 29, pp. 360, 382.

Epiperola perornata Dyar, Proc. U. S. N. M., 1906, Vol. 29, p. 383.

We are in receipt of a single male from the Baboquivari Mts., Pima Co., Arizona (O. C. Poling), which we submitted to Dr. Schaus for comparison with neotropical material.

Dr. Dyar's type came from French Guiana but Dr. Schaus informs us that he has other specimens from Costa Rica, and that it is a Limacodid.

Both the genus and species are extremely peculiar and do not find any close ally in any known species from Boreal America. In fact the genus violates the keys and the usual conception of its family, vein 8 of the hind wing anastomosing with cell near base only. According to Forbes' Key (*Psyche*, 1914, Vol. 21, pp. 53-65) it would fall into the Cossidae. By Hampson's Key (*Cat. Lep. Phal. B. M.*, 1898, Vol. 1, pp. 17-20) it falls into the Ratardidae or the Cossidae.

THE GENUS COCCOTORUS LECONTE (COLEOPTERA).

BY F. H. CHITTENDEN, *U. S. Bureau of Entomology.*

On September 5, 1924, Mr. Arthur G. Ilse wrote from D'Hanis, Medina County, Texas, in regard to a curculio breeding from the seeds of a bush called in that region "wild peach," determined in the Bureau of Plant Industry as *Prunus minutiflora*. At the time of receipt beetles were already issuing or had issued from the fruit and specimens were referred to Mr. Fred E. Brooks, who in turn showed them to the writer, stating that he suspected that although the species was closely related to the plum gouger, *Anthonomus scutellaris* Leconte, there were some differences. Accordingly, the writer has made a study of this material, in comparison with related species, finding that the form from Medina County, Texas, is quite distinct from the other two species which have been classified by Dietz as belonging to the subgenus *Coccotorus*. Inasmuch as we now have three species of *Coccotorus* and the genus *Anthonomus* is already overcrowded with upwards of 90 described species, it is advisable and timely that the genus be recognized as such.

COCCOTORUS Leconte.

Coccotorus Leconte, J. L., Proc. Amer. Philos. Soc., 1876, p. 193.

Coccotorus Leconte, Dietz, W. G., Trans. Am. Ent. Soc., v. XVIII, p. 190, 1891.

Genotype.—*Coccotorus scutellaris* Lec.

Since this genus has been fully and ably described by Dietz, little remains for mention other than that it was founded principally on the outstanding feature of the male pygidium, which is large, strongly convex, transversely oval, more or less exposed, and inflexed, together with the deeply emarginate fifth ventral segment into which it is inserted.

The three species composing this genus may be separated by means of the following table:

Rostrum ♀ moderately short and thick, distinctly carinate; femoral teeth large, of middle femora nearly as long as anterior.	
Vestiture of elytra dark reddish purple with few blackish tufted areas; prothorax with pale yellowish hairs, Me.—Tex.....	<i>scutellaris</i> Leconte.
Vestiture of elytra and venter bright red, strongly mixed with whitish gray hairs; prothorax bright red with a narrow median gray line, Nebr.....	<i>hirsutus</i> Bruner.
Rostrum ♀ longer and more slender, feebly carinate in front of eyes; femoral teeth short, of middle pair much smaller than anterior.	
Vestiture whitish gray on elytra, thickly interspersed with long nearly black semierect hairs arranged in dense tufted areas; thorax scarcely lighter than elytra, Tex.....	<i>pruniphilus</i> , new species.

***Coccotorus pruniphilus*, new species.**

Elongate ovate, strongly convex; dark reddish brown throughout; head and rostrum from base to point of insertion of antennae somewhat sparsely clothed with stiff, dark brown, suberect hairs; prothorax densely coated with long dark hairs intermixed with a few gray hairs in basal half; elytra densely clothed with very fine gray pubescence and with strongly subtessellately arranged large deep brown tufted areas of semierect hairs, imparting a very dark appearance to the insect.

Rostrum ♀ about $\frac{1}{2}$ as long as the body, longer than head and prothorax together, nearly straight, slender, moderately thickened at the base from which it narrows gradually to the point of insertion of the antennae, from there subequal in diameter; feebly, or not at all, carinate, except in a short area in front of the eyes. Antennae inserted $\frac{3}{5}$ from base; scape nearly as long as funicle. Prothorax parallel at sides in basal three-fifths, slightly widest in front of middle, abruptly and obliquely narrowed to apex. Elytra with prominent humeri, widest at a point less than one-fourth from the apex; striae rather narrow, deeply impressed, somewhat irregularly coarsely punctate, punctures obscured by vestiture. Anterior femoral teeth acute, proximal edge nearly perpendicular, median feeble, scarcely larger than posterior pair.

Rostrum ♂ about $\frac{2}{5}$ as long as the body, stouter than in ♀, a little more strongly pubescent, feebly carinate from base to near the middle. Antennae inserted nearer the apex. Pygidium short oval, outline subcircular, usually retracted.

Length ♀ 5.4 mm.; width 2.9 mm.; length of rostrum ♀ 2.6 mm.; length ♂ 5.0 mm.; width 2.7 mm.; length of rostrum ♂ 2.0 mm.

D'Hanis, Llano, Tex.

Reared from the seed of *Prunus minutiflora* in June, 1924 (Arthur G. Ilse).

Type ♀.—Cat. No. 27478, U. S. National Museum.

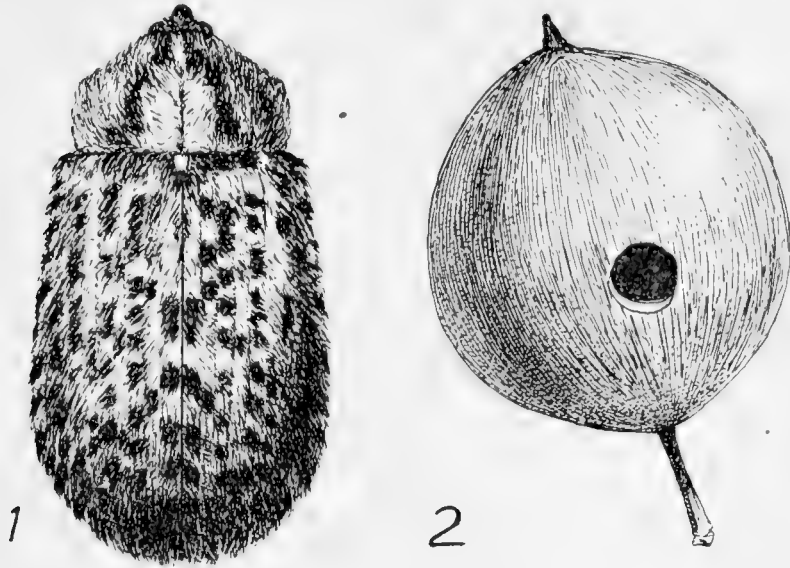


Fig. 1. *Coccotorus pruniphilus*, showing outline and vestiture.

Fig. 2. Wild plum seed, showing exit hole of *Coccotorus pruniphilus*.

Closely related to *scutellaris*, differing especially by the much more hairy and pubescent vestiture, the longer, more slender, feebly carinate female rostrum and the more coarsely punctate elytral striae. The much more numerous dark hairy tufts on the elytra, and the retracted short oval pygidium in the male are also striking characters. In *scutellaris* the male pygidium is more extruded in all specimens examined.

The rostral carina is obsolete or wanting in some females; in others it is apparent only in the proximal fourth or fifth. No short-beaked females have been observed in the material examined, although these are of common occurrence in *scutellaris*.

Coccotorus scutellaris Leconte.

Anthonomus scutellaris Leconte, J. L., Proc. Ac. Nat. Sci., Phila., 1858, p. 79;

Dietz, l.c., p. 190; Blatchley and Leng, Rhynch. E. U. S., 1916, p. 287, 288.

Anthonomus (?) *prunicida* Walsh, B. D.; Prairie Farmer, June 13, 1863, p. 372, figs. I, II, Walsh, Proc. Bos. Soc. Nat. Hist., 1863, p. 309.

Coccotorus scutellaris Leconte, Proc. Am. Phil. Soc., 1876, p. 194.

This species is sufficiently well known to require no further remarks here other than to add a few exact localities.

The species was described from Texas and Georgia. Walsh added Rock Island, Ill., Blatchley and Leng, Lake and Posie Counties, Ind., New York vicinity, Lakehurst, N. J., and Massachusetts. Localities noted by the writer include: Missouri,

Topeka, and Riley County, Kans.; Cambden, Ark., Fort Collins, Colo.; Fort Valley, Ia.; French Creek, W. Va.; Prelsburg, Dallas, Tex.

The other two species here treated, as far as known, attack only wild *Prunus* but may well be under suspicion as potential pests for the reason that although they have not yet been detected on cultivated fruits, there is strong probability that in the course of time, with the ultimate disappearance of their wild food plants in large areas, they may not hesitate to attack cultivated *Prunus*, otherwise they would eventually perish. They are hardy insects and capable of sustained flight.

Coccotorus hirsutus Bruner.

Coccotorus hirsutus Bruner, Rept. Nebr. State Bd. Agr., f. 1888, p. 126.

Anthonomus hirsutus Bruner, Dietz, W. G., Tr. Am. Ent. Soc., v. 18, p. 191, 1891.

Body four-ninths as wide as long, red-brown throughout. Vestiture brightly colored, consisting of dense long, hirsute or shaggy hairs, those on thorax and elytra about equally long and closely crowded, on thorax and middle three-fourths of sutural interval ferruginous, on elytra white and ash-gray, more or less densely mottled with shades of ferruginous; lower surface sparsely clothed with long fine ash-gray hairs; legs more sparsely clothed with shorter and finer hairs.

Rostrum longer and slenderer than in *scutellaris*, feebly carinate. Femoral teeth shorter, anterior tooth with distal edge of base strongly oblique.

Length 4.5 mm.; width 2.0 mm.; rostrum 2.0 mm.

West Point, Nebraska.

Attacks the fruit of the sand cherry (*Prunus pumila*) in a manner similar to *scutellaris* on plum. The sand cherry is edible and although it appears to have no very definite commercial status, it was used, according to its describer, by many of the settlers in Nebraska, especially by those living in some of the northwestern counties. Of its injuries, he states that in the month of June he observed the punctures of the beetle on the young fruit when it was about the size of a large pea, that its work was quite like that of the plum gouger, and that its injury to the fruit was quite as decided.

TWO NEW SPECIES OF THE TACHINID GENUS LIXOPHAGA, WITH NOTES AND KEY (DIPTERA).

BY J. M. ALDRICH.

Although I have published on this genus recently (*Insecutor* Ins. Menstruus, Vol. 12, 1924, p. 146), the rearing of two new species calls for the publication of descriptions, and gives opportunity to add a key and notes.

The genus includes only small species, which have the first

posterior cell ending almost in the exact tip of the wing. They have the eyes bare; face receding, parafacials bare except a few small bristly hairs close to vibrissae; third antennal joint elongate, second short, arista with small basal joints; two upper frontals reclinate; the lowest frontal not quite reaching the level of the tip of second antennal joint; palpi and proboscis normal. Discal abdominal bristles absent or feebly developed. Venation normal except as noted, third vein with only a few hairs at base.

KEY TO SPECIES OF LIXOPHAGA.

Males.

1. Without orbital bristles2.
- With orbital bristles3.
2. Abdomen broadly yellow on sides (West Indies; Gulf region)
diatraeae Townsend.
 Abdomen without yellow on sides (widespread).....*variabilis* Coquillett.
3. Parafacial much narrower below than third antennal joint (Virginia).....
mediocris, new species.
 Parafacial as wide as third antennal joint (widespread)....*plumbea* new species.

Females.

1. Parafacial at narrowest wider than third antennal joint....*plumbea* new species.
 Parafacial below much narrower than third antennal joint.....2.
2. Third abdominal segment when viewed from behind with broad median black stripe (Virginia).....*mediocris* new species.
 Third abdominal segment with narrow partial stripe or none.....3.
3. Abdomen with coarse black dots from which the hairs arise, and usually distinctly yellow on sides basally.....*diatraeae* Townsend.
 Abdomen without coarse dots, the sides not yellow.....*variabilis* Coquillett.

***Lixophaga variabilis* Coquillett.**

Hypostena variabilis Coquillett, Jour. N. Y. Ent. Soc., III, 1895, 57; Revis. Tachin., 1897, 17, 62.

Lixophaga parva Townsend, Muscoid Flies, 1908, 86.

Euzenillia aurea Townsend, Jour. N. Y. Ent. Soc., XX, 1912, 111.

Euzenillia variabilis Townsend, Ins. Ins. Menst., IV, 1915, 121.

Tachinophyto variabilis Greene, Proc. U. S. Nat. Mus., vol. 60, 1922, 11, fig. 35, puparium.

Lixophaga variabilis Aldrich, Ins. Ins. Menst., XII, 1924, 146.

Specimens in the National Museum include the female type of *variabilis*, from Algonquin, Illinois (Nason), with another female having same data; the female type of *Euzenillia aurea*, from Melrose Highlands, Massachusetts (Townsend); the male type of *parva*, reared at Dallas, Texas, from *Lixus scrobicollis* by W. D. Hunter; other specimens reared from *Laspeyresia molesta* at Vienna, Virginia, by L. A. Stearns; from lepidopterous larva at Knoxville, Tennessee, by W. B. Cartwright

(Knoxville No. 1991); from *Carpocapsa pomonella* at Agnew, California, by J. F. Lamiman; from *Oberca maculata* at Washington, District of Columbia (Chittenden No. 6762); from apple twig borer, College Park, Maryland; from *Epiblema strenuana* Walker at Valley Forge, Georgia, by B. S. Brown (Quaintance No. 21903); and from *Sphenophorus pontederiae* at Stoughton, Massachusetts, by Doris H. Blake.

Unreared specimens are from Base of Mount Washington, New Hampshire (Townsend); Sebago Lake, Maine (Townsend); Waterbury, Connecticut (Townsend); Plummer's Island, Maryland (H. S. Barber); Lafayette and Monon, Indiana (Aldrich); Aberdeen, South Dakota (Aldrich); Opelousas, Louisiana (Pilate); Audubon Park, New Orleans, Louisiana (T. E. Holloway); and Havana, Cuba (C. F. Baker).

The rearing from *Carpocapsa* mentioned by Coquillett, 1897, 17, is an error of identification; the single male specimen has orbitals and must belong to another species, although undoubtedly congeneric. As it is not in very good condition, I refrain from describing it. This is the same specimen from which Townsend drew the male characters of *Euzenillia* (Ins. Ins. Menst., IV, 1916, 32).

The specimens upon which Coquillett based his two other rearing records in the same place are not now with the species, and I fear were found to belong elsewhere; but they can not now be traced. Some of his localities on page 68 are not represented in the material now assembled under the species, and probably the specimens were also removed to other species.

***Lixophaga diatraeae* Townsend.**

Euzenilliopsis diatraeae Townsend, Ins. Ins. Menst., IV, 1915, 76.—Holloway, Jour. Econ. Ent., XII, 1919, 176.—Van Zwaluwenberg, Jour. Econ. Ent., XVI, 1923, 227.

Lixophaga diatraeae Aldrich, Ins. Ins. Menst., XII, 1924, 146.

This is an important parasite of the sugar-cane borer, *Diatraea saccharalis*. Originally occurring in Cuba, it has been introduced into Louisiana and Mexico (Los Mochis, Sinaloa). In Mexico it is said to parasitize *Diatraea lineolata* Walker.

Material in the National Museum consists of 35 specimens including the type, from Cuba, Porto Rico and Trinidad, mostly bred. While the male separates readily from *variabilis* on account of having the abdomen broadly yellow on the sides, the female is almost alike in the two species. The unknown female of the specimen Coquillett took for the male of *variabilis* must be almost inseparable from these.

***Lixophaga plumbea*, new species.**

Male.—Front wide (by micrometer three measured .36, .37, and .40 of head-width, averaging .38); the parafacials and parafrontals rather plumbeous, or

lead colored, the latter, however, slightly approaching silvery. Two pairs verticals, the outer small; ocellars normal, two pairs of orbitals, frontals seven, the upper three reclinate, the lowest frontal at the level of the tip of the second antennal joint. Parafacials bare, about as wide as the third antennal joint. Antennae black, reaching almost to the edge of the mouth; the third joint five times the second. Arista short, thickened for more than half its length. Vibrissae at edge of mouth, 6 or 8 decreasing bristles in a rather close row on the facial ridges ascending about two-fifths of the way, but the upper ones minute. Proboscis small, palpi normal, yellow. Bucca about one-third the eyeheight. Frontal stripe at narrowest less than one-half the width of one parafrontal. Thorax gray, with stripes as in preceding species. Chaetotaxy: acrostichal 3, 3; dorsocentral 3, 3; humeral 3; posthumeral 1; presutural 1; notopleural 2; supraalar 2 (the posterior large); intraalar 3; postalar 2; scutellum with two pairs of marginals and one still longer pair of apicals, no smaller hairs between them, and one pair of small discals; sternopleural 2, 1; pteropleural minute; scutellum concolorous with thorax, not at all yellow at apex.

Abdomen entirely black, segments two and three broadly gray, pollinose, the pollen becoming thin about the middle so that the posterior half, or in some lights more, is subshining. A narrow median shining stripe on edge. Fourth segment with a more dense and slightly yellowish crossband of pollen on the anterior half, the remainder shining; first and second segment with one pair median marginals and one lateral; third segment with a marginal row of 10; fourth segment with two erect rows on apical half. Venter black, thinly pollinose, without any special patch of hairs.

Legs black, claws and pulvilli small. Mid tibia with a single bristle on the outer front side. Hind tibia with a very irregular row on outer side.

Wings hyaline, the fourth vein with an oblique rounded bend meeting the third vein in the margin so as to close the first posterior cell only slightly before the apex; third vein with two or three hairs at base; no costal spine.

Female.—Front scarcely wider than in male (by micrometer 3 measured .38, .38, and .41, average .39). Parafacial decidedly wider than third antennal joint; otherwise as in male.

Described from 11 males and 11 females. 13 of these specimens of both sexes were reared by R. A. Cushman at East Falls Church, Virginia, from *Rhyacionia frustrana* Comstock; the dates of emergence are from June 30 to July 7. One male specimen was reared at Falls Church, Virginia, from *Laspeyresia molesta* Busck, on July 10, 1920. One female from Red Bank, New Jersey, August 8, was reared from *Phalonia oenotherana* Riley. One female Riverton, New Jersey, Exp. No. 86—E1. Unreared specimens are from Brookings, South Dakota (Aldrich), Falls Church, Virginia (Banks), Plummer's Island, Maryland (Shannon). The type is from the lot first mentioned.

One additional female from Lacrosse, Indiana, July 18, 1913, has a row of 10 marginals on the second segment, one discal on the third segment, and a small fourth sternopleural below

the others anteriorly. It agrees so perfectly in other respects that I do not doubt that it belongs to the same species.

Type.—Male, Cat. No. 28110, U. S. N. M.

***Lixophaga mediocris*, new species.**

Male.—General color gray with black legs and antennae, and yellow palpi. Abdominal segments 2-4 shining black on more than apical half. Front rather broad (by micrometer three measured .30, .34, .36 of headwidth, averaging .33), the pollen tinged with yellow; parafacials bare, silvery gray, narrow, less than half as wide at narrowest as third antennal joint. Verticals two pairs, ocellars normal, orbitals two pairs, frontals about 6, second pair large and reclinate, first and third smaller, lowest even with tip of second antennal joint; vibrissae at edge of mouth, not approximated, three or four diminishing bristles or hairs above them. Antennae reaching almost to vibrissae, third joint four times the second, arista rather long, enlarged nearly to middle. Palpi of ordinary size, yellow; bucca almost one-fourth the eyeheight.

Thorax black, a little bronzed, when viewed from behind showing four dark stripes alternating with wider yellowish-gray pollinose ones; the outer dark ones interrupted at the suture, and the inner somewhat blending behind it. Chaetotaxy: acrostichal 3, 3 (one just before the suture); dorsocentral 2, 3; humeral 2, posthumeral 2; presutural 2 (the inner small but distinct); noto, pleural 2; supraalar 2; intraalar 3; postalar 2; scutellum with two lateral pairs a small discal, and a minute apical pair usually not crossed, sometimes irregular, sternopleural 2, 1; pteropleural 0.

Abdomen subshining black, the basal third to half of segments 2-4 with yellowish pollen interrupted or partially so in middle and interspersed with dots, especially on third; first and second segments with one pair median marginals and one lateral; third segment with marginal row of 6 stout; fourth with small discals and stout marginals. Genitalia black. Venter with the pollinose bands as on dorsum, no specialized patches of fine hairs.

Legs black, claws and pulvilli small. Front tibia with one bristle on outer hind side; mid tibia with one on outer front; hind tibia with very irregular row on outer side.

Wings hyaline, third vein with usually 2 hairs at base; fourth vein with rounded, oblique bend, the apical cell open and ending but little before extreme tip of wing.

Female.—Front wider (in three .37, .37, and .38, average .37); third abdominal segment with a pair of smallish but distinct discals. The pollen of the abdomen forms wider and less distinct bands than in the male, but there is the same appearance of a narrow, median dark stripe, less distinct or absent on fourth segment. Scutellum with minute apicals as in male. No piercer or special egg-laying organ.

Length, 3 to 3.8 mm.

Described from 29 males and 23 females reared at East Falls Church, Virginia, from *Rhyacionia frustrana* Comstock, by R. A. Cushman. Emergence June 26 to July 8, 1924.

Type.—Male, Cat. No. 28109, U. S. N. M.

Actual date of publication, July 3, 1925.

EDITORIAL.

Last year, the one-hundred-and-forty-eighth of the Republic Free and Enlightened, the Sovereign State of Tennessee, at the instigation of Bryan and the "Fundamentalists" and by a majority vote of its legislators, duly elected and qualified, passed a law forbidding the teaching of evolution in all schools and colleges supported by or receiving money from the State. The law explicitly forbids the teaching of scientific theories of man's descent from lower animals as being contrary to the Bible; and it implicitly enjoins any scientific teaching which does not conform to a literal interpretation of Genesis. Under this law a professor of biology has been indicted for teaching the Evolution Theory to his pupils—the only decent and honest thing he could do as a biologist—and as his trial approaches the clans are gathering for battle. A howl has gone up that is resounding around the world, and the papers are full of monkey talk. Some people who have been at great pains to make monkeys of themselves are getting feverishly excited over the suggestion that they may have monkey ancestors. This monkey business is doing much to confuse the public, and the pother in press and pulpit over the conflict or concordance of religion and science is simply adding to the confusion. Neither religion nor science is on trial in Tennessee; nor is Genesis, nor even evolution. Whether religion and science agree or disagree, whether Genesis and evolution conform or conflict depends upon what one understands by each, and is all beside the point at that. The whole business is absurd and contemptible and thinking people could very well dismiss it as simply another antic of "*Boobus americanus*," but for one very significant fact which the Bryanites are careful to conceal. The attack upon evolution is not a thing apart. It is merely an extension of the tactics that gave us Volsteadism and the Klu Klux, part of a systematic attempt to set up a state religion which shall control us in thought, word and deed and which may invoke the secular arm to enforce its decrees. Bryan and his ilk can not do this openly. American tradition and the Constitution forbid. But what can not be done openly and *en bloc* may be done by subterfuge and piecemeal. And they are resorting to every trick of demagoguery to accomplish their end. That their religion is of an obscurantist brand and that biology happens to run afoul of their conceits are mere details. The significant thing is that if they succeed there will be an end to liberty of thought and investigation as well as of action and speech. We shall be regulated by something viler and deadlier—more inimical to culture—than sixteenth-century intolerance. No science could prosper in such an atmosphere. Science will not submit its findings to the vote of majorities—Tennessean or other. Truth is not established in any such way. And truth is the sole concern of Science. She will teach truth as she sees it, in her way—regardless.

—Carl Heinrich.

NOTES AND NEWS ITEMS.

A General Textbook of Entomology, including the anatomy, physiology, development, and classification of insects by A. D. Imms. One pound 16 shillings, illustrated, 698 pages. Methuen & Company, Ltd., 36 Essex Street, W. C. London, 1925.

This book is the best of its class that has appeared in the last quarter of a century and places its author unquestionably with that group of eminent entomologists, Packard, Sharp and Henneguy.

Its aim is to present in the form of an advanced textbook the "chief facts concerning the structure, physiology, development and classification of the insecta and the biology of their more important representatives." It has been necessary to very decidedly curtail the reference to behavior, ecology, coloration, cytology, etc., and the very extensive branch of palaeontology is purposely omitted.

The book is divided into three major parts—the first 150 pages are devoted to anatomy and physiology. This part of the book is more lucidly presented and more comprehensively treated than in any general textbooks so far published. The illustrations and subject-matter are drawn from the best sources available. The many fine figures of Snodgrass, Holmgren and Miall and Denny, with the numerous figures prepared especially for this publication add materially to the interpretation of the text.

In the second part (40 pages) development and metamorphosis are briefly but clearly treated. The remainder of the book, about 475 pages, is devoted to a consideration of the Insecta by orders, including with each order and the more important families detailed accounts of the anatomy, both external and internal, development, and biology.

The general classification follows Sharp and Shipley adding the more recently discovered order Protura to the Apterygota and throwing the Anapterygota, Exopterygota and Endopterygota together under the designation Pterygota. The Siphonaptera are placed under the Endopterygota instead of the Anapterygota.

The classification in brief is as follows: Class Insecta, sub-class 1, Apterygota with three orders, sub-class 2, Pterygota with two divisions, the Exopterygota, containing 11 orders, and the Endopterygota, containing 9 orders. A total of 23 orders in all, as opposed of the 33 and 37 orders of Handlirsch, and Brues and Melander.

It is a book which every entomologist should have within easy reach, and one which should rapidly find its place as a standard text-book in our universities and colleges.

—*J. A. Hyslop.*

PROCEEDINGS
OF THE
ENTOMOLOGICAL SOCIETY
OF WASHINGTON

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**LIST OF PARASITIC INSECTS REARED FROM HOST INSECTS
COLLECTED IN THE VICINITY OF BROWNSVILLE, TEXAS.**

BY R. A. VICKERY, *U. S. Bureau of Entomology.*

The parasitic Hymenoptera and parasitic Diptera listed in this publication were reared at Brownsville, Texas, during the years from 1910 to 1917. The species of Diptera were identified by Dr. J. M. Aldrich and Mr. W. R. Walton, the Hymenoptera by R. A. Cushman and A. B. Gahan, the Lepidoptera by Dr. H. G. Dyer. The identified specimens are located in the collections of the U. S. National Museum. The author is also indebted to Messrs. Gahan and Cushman and to Mr. S. A. Rohwer for an examination and criticism of the completed manuscript.

HYMENOPTERA: BRACONIDAE.¹

Meteorus laphygmae Viereck, reared from:

<i>Laphygma frugiperda</i> (A. & S.)	January, ² April, May, June, July, September, October, November, and December.
<i>Laphygma exigua</i> (Hbn.)	May, July, October.
<i>Prodenia</i> sp. ³	June, July, April.
<i>Feltia annexa</i> (Treit.)	April, May.
<i>Cirphis latiuscula</i> (H. S.)	November, December, February, March, and April.
<i>Cirphis unipuncta</i> (Haw.)	January, February, March.
<i>Monodes nucicolora</i> Gn.	April, May.
<i>Macaria punctolineata</i> Packard	May.
<i>Autographa</i> sp. ⁴	July.
<i>Eurymus eurytheme</i> (Bdv.)	October, March, December.
<i>Heliiothis obsoleta</i> (Fabr.)	March, April, October.

¹Specimens were collected and parasites reared by C. L. Scott, E. G. Smyth, R. A. Vickery, and T. S. Wilson.

²The month given is that in which the host larvae were collected.

³*Prodenia latifascia* Walker, *Prodenia praefica* Grote, *Prodenia ornithogalli* Guenée, *Prodenia eridania* (Cramer), and *Prodenia eudiopta* Guenée, were collected at Brownsville, but we could not separate the caterpillars.

⁴*Autographa brassicae* (Riley) and *Autographa oo* (Cramer) were collected at Brownsville, but we could not separate the caterpillars.

Apanteles marginiventris (Cresson), reared from:

<i>Laphygma frugiperda</i> (A. & S.)	January, April, May, September, October, November, and December.
<i>Laphygma exigua</i> (Hbn.)	May, October.
<i>Prodenia</i> sp.	April, June.
<i>Cirphis unipuncta</i> (Haw.)	January, October.
<i>Plathypena scabra</i> (Fabr.)	March.
<i>Autographa</i> sp.	October.
<i>Heliothis obsoleta</i> (Fabr.)	March, April.

Apanteles militaris Walsh, reared from:

<i>Cirphis latiuscula</i> (H. S.)	January, February, March, April, October, November, and December.
<i>Cirphis unipuncta</i> (Haw.)	January, February, March, April, and October.
<i>Heliothis obsoleta</i> (Fabr.)	October.

Apanteles rufocoxalis Riley, reared from:

<i>Cirphis latiuscula</i> (H. S.)	January, March, April, November, and December.
<i>Cirphis unipuncta</i> (Haw.)	February, March, April.

Microplitis varicolor Viereck, reared from:

<i>Cirphis latiuscula</i> (H. S.)	March, April.
<i>Cirphis unipuncta</i> (Haw.)	March, April.

Microplitis brassicae Muesebeck, reared from:

<i>Autographa brassicae</i> (Riley)	April.
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Microplitis feltiae Muesebeck, reared from:

<i>Feltia annexa</i> (Treit.)	June.
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Microplitis croceipes (Cress.), reared from:

<i>Heliothis obsoleta</i> (Fabr.)	April.
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Opius otiosus Gahan, reared from:

<i>Agromyza parvicornis</i> Loew	
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Zele melleus (Cresson), reared from:

<i>Laphygma frugiperda</i> (A. & S.)	October.
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Chelonus texanus Cresson, reared from:

<i>Laphygma frugiperda</i> (A. & S.)	Every month except February.
<i>Laphygma exigua</i> (Hbn.)	October, July.
<i>Prodenia</i> sp.	June, July.
<i>Heliothis obsoleta</i> (Fabr.)	April.

Rogas laphygmae Viereck, reared from:

<i>Laphygma frugiperda</i> (A. & S.)	April, May, June.
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Rogas molestus Cresson, reared from:

<i>Autographa</i> sp.	March, April, June, July, and October.
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Rogas atricornis Cresson, reared from:

<i>Cirphis unipuncta</i> (Haw.)	January, February, March, and April.
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HYMENOPTERA: ICHNEUMONIDAE.

Sagaritis dubitatus (Cresson), reared from:

<i>Laphygma frugiperda</i> (A. & S.)	January, April, May, June, and July.
<i>Laphygma exigua</i> (Hbn.)	May.
<i>Autographa</i> sp.	April.
<i>Prodenia</i> sp.	July.
<i>Heliothis obsoleta</i> (Fabr.)	March, April.

Neopristomerus appalachianus Viereck, reared from:

<i>Laphygma frugiperda</i> (A. & S.)	March, April, May, June, July, August, September, October, and November.
<i>Laphygma exigua</i> (Hbn.)	October.
<i>Prodenia</i> sp.	April, July.

Ophion bilineatus Say, reared from:

<i>Laphygma frugiperda</i> (A. & S.)	January, April, May, June, August, September, October, November, and December.
<i>Laphygma exigua</i> (Hbn.)	May.

Enicospilus purgatus (Say), reared from:

<i>Cirphis latiuscula</i> (H. S.)	December.
<i>Cirphis unipuncta</i> (Haw.)	February.

Amblyteles brevipennis (Cress.)

<i>Cirphis unipuncta</i> (Haw.)	April.
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Gelis minimus (Walsh), reared from:

<i>Apanteles militaris</i> Walsh	December, February, March and April.
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Myrmicomorpha pernicioso Viereck, reared from:

<i>Apanteles militaris</i> Walsh	February.
<i>Meteorus laphygmae</i> Viereck	July.
<i>Rogas laphygmae</i> Viereck	July.

HYMENOPTERA: CHALCIDIDAE.

Spilochalcis pallens (Cresson), reared from:

<i>Meteorus laphygmae</i> Viereck	June, July, September.
<i>Rogas laphygmae</i> Viereck	July.

Spilochalcis torvina (Cresson), reared from:

<i>Meteorus laphygmae</i> Viereck	July, September.
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HYMENOPTERA: PTEROMALIDAE.

Dibrachys meteori Gahan, reared from:

<i>Meteorus laphygmae</i> Viereck	June, July.
<i>Sagaritis dubitatus</i> (Cresson)	June.
<i>Rogas laphygmae</i> Viereck	June.

Eupteromalus viridescens (Walsh), reared from:

Apanteles militaris Walsh December, February, March.

HYMENOPTERA: EUPELMIDAE.

Eupelminus meteori Gahan, reared from:

Meteorus laphygmae Viereck July.

HYMENOPTERA: EULOPHIDAE.

Euplectrus platyhypenae Howard, reared from:

Prodenia sp. July.
Laphygma frugiperda (A. & S.) January, April, May, June,
 July, September, October,
 November, December.
Laphygma exigua (Hbn.) October.
Cirphis latiuscula (H. S.) March, April, October,
 November, and December.
Cirphis unipuncta (Haw.) February, October.
Euplectrus comstockii Howard, reared from:
Heliothis obsoleta (Fabr.) March.
Autographa sp. April, June, July, and October

HYMENOPTERA: ENCYRTIDAE.

Litomastix truncatellus Dalman, reared from:

Autographa sp. April, July, October.

DIPTERA: TACHINIDAE.

Archytas piliventris V. d. W., reared from:

Laphygma frugiperda (A. & S.) January, March, April, May,
 June, August, September,
 October, November, December.
Cirphis latiuscula (H. S.) October, November, December,
 and April.
Cirphis unipuncta (Haw.) February, April.

Archytas analis Fabr., reared from:

Cirphis unipuncta (Haw.) April.
Monodes nucicolora Gn. May.

Peleteria robusta Wied., reared from:

Cirphis latiuscula (H. S.) April.
Cirphis unipuncta (Haw.) January, February, March.

Frontina archippivora Will., reared from:

Laphygma frugiperda (A. & S.) April, May, June, July.

Chaetophlepsis tarsalis Tns., reared from:

Autographa sp. July.

Plagia americana Van der Wulp, reared from:

Autographa sp. October.

Phorocera marginalis A. & W., reared from:

Macaria punctolineata Packard June, July.

Nemorilla maculosa Mg., reared from:

Amorbia emigratella Busck July.

Metachaeia helymus Walker, reared from:

Monodes nucicolora Gn. May.

DIPTERA: SARCOPHAGIDAE.

Helicobia helcis Town., reared from:

Lycophotia margaritosa (Haw.) April.

A NEW SPECIES OF TRICHALOPHUS (COLEOPTERA).

BY F. H. CHITTENDEN, *U. S. Bureau of Entomology.*

Trichalophus foveirostris, new species.

Cylindrical ovate; black, antennae and legs dull dark brown, coated with minute scales of varying colors. Rostrum and head together longer than the prothorax, frontal fovea continuous with a deep, wide sulcus extending nearly to apex, punctation moderate, dense. Prothorax about as long as wide, truncate at both extremities, sides very feebly arcuate, at middle of disc in median fourth a finely impressed line; surface of disc and sides moderately scabrous, feebly depressed in apical third, punctation coarse, rugose, a small, yellow mass of scales just behind middle on each side; scutellum a little transverse, coated with yellow scales. Elytra considerably wider than prothorax, nearly twice as long as wide, humeri not discernible, sides subparallel, apex strongly narrowed. Elytral striae rather deep, with punctures large, subquadrate, usually closely but irregularly placed as regards distance; intervals 1 and 2 equal, 3 wider, remainder subequal; surface coated with more or less bronzy red, bronze brown, and black and yellow mixed; above the center on intervals 4 and 5 there is a conspicuous fascia of bright golden yellow scales, and toward the apical declivity there is a similar narrower fascia on interval 5. Ventral surface brown with fine coating of light pubescence. Legs moderately clavate, also feebly pubescent.

Length, 9 mm.; width, 4 mm.

Type locality.—Skyland, Page Co., Va., June 15, 1924 (Alan S. Nicolay). One specimen.

Type.—In Mr. Nicolay's collection.

This species obviously belongs to *Trichalophus* Lec., although the striae punctures of the elytra are quite distinct, instead of being "almost or quite obliterated" and the dorsal surface is squamose; in short, it is quite different from any described species known to the writer by the principal characters furnished in the description.

SOME OBSERVATIONS UPON *NECREMNUS LEUCARTHROS*
(NEES) (HYMENOPTERA: EULOPHIDAE).

BY T. R. CHAMBERLIN, *U. S. Bureau of Entomology.*

In the summer of 1923, the writer received at the laboratory of the U. S. Bureau of Entomology at Hyères, Var, France, some shipments of cocoons of the alfalfa weevil (*Phytonomus posticus* (Gyll.)) from which the eulophid, *Necremnus leucarthros* issued.¹ The character and identity of the insect was not known to the writer at the time of its emergence but it was suspected of being a secondary of the alfalfa weevil, possibly through *Itopectis maculator* (Fab.) or *Dibrachoides dynastes* (Först.) In experiments conducted at the laboratory it could not be made to reproduce upon *Dibrachoides dynastes* but it reproduced freely as an external parasite upon the prepupae of the alfalfa weevil. No attempts were made to breed it upon *Itopectis maculator* because of the scarcity of this species.

PREVIOUS HISTORY AND DISTRIBUTION.

Necremnus leucarthros was first described by Nees von Esenbeck in 1834 under the name *Eulophus leucarthros* from specimens taken in flowers of *Anethus graveolentus* at Sickerhaus, Germany in July (1). The species was transferred to the genus *Necremnus* by Thomson (2) in 1878 who stated that it occurred all over Sweden but specified no locality. Dr. Franz Ruschka (3) records it as a parasite of the Chrysomelid, *Lema cyanella* Linn., infesting *Hordeum sativum* at Eisgrub, Moravia. The species is recorded and illustrated but not described by Graham-Smith (4) who states that it is a parasite in puparia of Diptera but he mentions no localities.²

In records of the alfalfa weevil work conducted in Europe in 1911, W. F. Fiske mentions an "external eulophid" found in alfalfa weevil cocoons, and Dr. Martelli in his "First Contribution to the Biology of *Phytonomus variabilis* Herbst" (5) speaks of an ecto-parasite of the larva which he calls "Eulophus sp." It may be that both of these men encountered the species under consideration. Dr. W. R. Thompson observed several species of Eulophids in his work on alfalfa weevil parasites in

¹The writer wishes to express his appreciation to Mr. A. B. Gahan for his determination of the insect and the references to the literature which he furnished.

²Of this Mr. Gahan says in correspondence, "I assume that it was somewhere in England, possibly at Cambridge where Graham-Smith was a lecturer * * *. It may be that the Graham-Smith record refers to a different species from that you are dealing with * * *. The host records seem to conflict * * *."

1912 and 1913 and he very probably saw this species although the writer has been unable to decide this point from Thompson's original notes. A study of material preserved by Mr. P. H. Timberlake at the Salt Lake laboratory of the Bureau of Entomology while he was engaged in parasite liberation there shows that the insect was found sparingly in material received from Portici, Italy, but Timberlake did not determine whether it was a primary or secondary parasite.

The writer has been able to add to the localities from which the parasite has been previously recorded the following: Piedimonte d'Alife, Italy, Tournon Ardèche and the environs of Chambéry, France. In the writer's experience the insect appeared rare except in a few instances where it was found in fair numbers.

REPRODUCTION OF NECREMNUS LEUCARTHROS (NEES).

The most important of the reproduction experiments with *N. leucarthros* was performed with 8 females and 1 male which were confined with 18 specimens of the host between June 9 and June 23, 1923, inclusive. The hosts, which usually were freshly spun prepupae of *Phytonomus*, were taken two at a time and kept in a tube with the eight females and one male from one to two days, when they were removed and two fresh prepupae supplied. The eggs, which were placed externally upon the hosts, were counted as accurately as was possible without disturbing them or the hosts but undoubtedly some eggs were overlooked. In six cases, egg records were not kept for the following reasons: one host was parasitized by a species of *Bathyplectes* and not oviposited upon, one died before oviposition by the parasites, one broke from its cocoon, the eggs on two were not observed until after they had hatched, and one pupated and cast the eggs off with the skin before they were counted. For some reason the parasites failed to oviposit upon one of the other hosts. On the remaining 11 hosts, a total of 212 eggs, or an average of 19.3 per host, were counted. The maximum number per host was 40 and the minimum 6. From the 40 eggs deposited upon a single host only four adults were produced, although most of the eggs hatched and many more than four of the larvae pupated. All of these were undersized. From this it would appear that so large a number of eggs per host is abnormal in nature. As many as 18 well developed adults were, however, secured from a single host.

The eggs were usually found on the day following the confinement of the parasites with the host. Most of the eggs were hatched on the day following that on which the eggs were observed. The meconium was cast in from 5 to 9 days, pupae appeared within 8 to 15 days and adults within 13 to 17 days.

Since two hosts were usually parasitized at the same time and these were kept and examined together throughout the experi-

ment, it was possible to study the effect of light or heavy feeding by the parasite upon the length of its larval period. When the number of larvae per host was large and the food supply per larva small, the larvae finished feeding early and pupated before the wellfed larvae which continued to feed until they had grown to large size. Nevertheless, results seemed to indicate that the pupal period in underfed individuals was somewhat lengthened, so that the whole time from egg to adult in underfed specimens was not shortened to the extent which might have been expected. The data on this last point are too meagre to do more than suggest the idea as stated.

CONCLUSIONS.

Though in our experience *Necremnus leucarthros* has proved to be rare, it has a wide distribution and breeds freely upon the prepupae of *Phytonomus posticus* in the laboratory. It would appear, therefore, that it could very probably be colonized in the United States and that it might increase its usefulness and parasitize a large percentage of the weevils under favorable conditions. This possibility is suggested by the case of the larval parasite *Tetrastichus incertus* (Ratz.) which has usually appeared unimportant as a parasite of the weevil in Europe but which in the summer of 1922, developed a high degree of parasitism at Piedimonte d'Alife, and Acerra, Italy.

REFERENCES TO LITERATURE.

- (1) Hymenoptera Ichneumonibus Affinum Monographie II, 1834, p. 172.
- (2) Hymenoptera Scandinaviae, Vol. V, 1878, p. 234.
- (3) Zeitschrift für angewandte Entomologie, 1915, Band II, Heft 2, p. 398.
- (4) Journal of Parasitology, Vol. II, 1919, p. 374.
- (5) 1911 Primo Contributo alla Biologia del *Phytonomus variabilis* Herbst., Boll. Lab. Sool. Agr. Portici, Vol. 5, p. 226-230.

A CHANGE OF NAME IN BUPRESTIDAE (COLEOPTERA).

BY W. S. FISHER, U. S. Bureau of Entomology.

In the Proc. U. S. Nat. Mus., vol. 66, 1925, Art. 31, pp. 38-39, I described a species of this family from Bolivia under the name of *Taphrocerus parvus*. Recently I received from Dr. Jan Obenberger a copy of a paper (Sbornik Ent. Nár. Mus. Praze, vol. 2, 1924, No. 13, pp. 57, 76) in which he has described a species under the same name from Paraguay. Since the name given to the species from Paraguay by Dr. Obenberger has priority, I propose the new name **Taphrocerus modicus** for the species I described from Bolivia under the name of *Taphrocerus parvus*.

TWO NEW CHIGGERS (TROMBICULA LARVAE).

BY H. E. EWING, *U. S. Bureau of Entomology.*

Each of the two new species of chiggers described in this short communication has a very unusual parasitic habit. One of them has been found only in the small axillary pouches of the front legs of an Indian gecko, and the other has the quite unusual habit of naturally parasitizing a tree toad. Few indeed are the ectoparasites that can find attachment to the smooth, slimy skin of an amphibian and endure the cutaneous acid secretions of these hosts. That this second species naturally infests the tree toad there can be no doubt for nymphs and adults have been reared from these amphibians captured in nature in a parasitized state.

***Trombicula gymnodactyli*, new species.**

Specimens as a whole typical for the genus in size, shape and color. Mouthparts smaller than usual. Palpi short, not reaching the tips of chelicerae, strongly down-curved. First palpal segment about three times as broad as long; second segment, or palpal femur, of about equal length and breadth, and but slightly swollen laterally; third segment slightly broader than long; fourth segment reduced and bearing the three-cleft palpal claw, which is longer than the segment bearing it and has the middle prong of its divided tip longer and stouter than the other two; fifth segment, or palpal thumb, small, short, not swollen, and bearing pectinate setae, some of which are over twice as long as the segment itself. Seta on palpal segment II with one or two barbs; seta on palpal segment III simple; setae on palpal segment IV either simple or with a single barb; some of the setae on segment V rather strongly pectinate. Chelicerae each with from five to seven sharp, recurved teeth above and four or five upturned, smaller teeth below. Eyes two each side, almost touching and almost equal. Dorsal shield small, with recurved setae and flagelliform and slightly pectinate pseudostigmatic organs. Number of dorsal abdominal setae about 24. Legs rather small and short, second pair slightly shorter than the other two pairs. Coxa I shorter than coxa II and bearing a single seta near its anterior margin; coxa II with a single seta which is situated near its posterior margin; coxa III shorter than either I or II, and with a single seta which is situated on the anterior margin near the base.

Length of engorged specimens, 0.52 mm.; width 0.30 mm.

Type host.—A Gecko, *Gymnodactylus lawderanus*.

Type locality.—Kooloo Valley, India.

Type slide.—Cat. No. 955, U. S. N. M.

Described from five specimens which were a part of a lot of many specimens that completely filled the axillary pits (mite pockets?) of the front legs of the host. The host specimen was taken in the Kooloo Valley, India, May, 1874, and bears the Museum of Comparative Zoology number 4803. It was sent to the writer for study by Joseph Bequaert, of the Department

of Tropical Medicine, of Harvard Medical School. This species is closely related to *Trombicula dentata* Ewing, from which it may be distinguished by having more ventral teeth to the chelicerae and fewer dorsal abdominal setae. *T. dentata* was described from specimens taken from a white-tailed deer and a cotton rat in the New World.

***Trombicula hylae*, new species.**

Larvae much longer than in the more typical species of the genus. Palpi rather slender, surpassing the chelicerae. First palpal segment about twice as broad as long; second segment longer than broad and not swollen; third segment slightly broader than long; fourth segment bearing the three-pronged palpal claw, the middle prong of which is much larger and longer than the other two; fifth segment, or palpal thumb, rather slender and not swollen. Seta on second palpal segment much longer than the segment itself and simple; seta on third segment long, simple; setae of fourth segment moderate and simple; some of setae of palpal thumb pectinate but two are simple in addition to a shorter spine-like seta which is simple. Chelicerae with peculiarly shaped arm. Instead of the arm being curved and claw-like it is almost straight, with an enlarged and flattened knob at the end. Above, this knob is recurved and bears a few irregular teeth. Galea small, with simple seta. Eyes two on each side, subequal, touching. Dorsal shield small, about as long as broad, front margin almost straight; behind, the shield is produced into a median angular process. Setae of dorsal shield six, in addition to the pseudostigmatic organs. There is a pair at the antero-lateral corners of the shield, a submedian pair near the front margin, and a pair at the postero-lateral angles. Pseudostigmatic organs short and apparently pectinate. Dorsal setae of abdomen about 26. Legs moderate. Coxa I with a single seta which is situated on the posterior margin just inside of spiracle; coxa II with a single seta which is on the anterior margin; seta on coxa III not observed.

Length of engorged specimen, 0.65 mm.; width 0.33 mm.

Type host.—A tree toad, *Hyla arenicolor*.

Type locality.—Cottonwood Creek, San Diego County, California.

Type slide.—Cat. No. 956, U. S. N. M.

Described chiefly from holotype specimen, which was one of many found infesting the ventral surfaces of tree toads of the species *Hyla arenicolor*. These toads were collected March 15, 1925, by L. M. Klauber, at Barrett Dam, Cottonwood Creek, San Diego County, California, and sent to the Division of Reptiles and Batrachians, United States National Museum. My attention was called to the infesting mites by Miss Doris M. Cochran. At present the writer is studying their very unusual habits of parasitism and will report on the same in a later paper. The nymphs have been reared in considerable numbers.

**NEW SERPHOID PARASITES FROM NORTH AND SOUTH
AMERICA (HYMENOPTERA).**

BY R. M. FOUTS.

This paper contains descriptions of nine new species of Hymenoptera belonging to the families Scelionidae and Diapriidae.

Measurements are as in the author's recent paper published in the Proceedings of the Entomological Society of Washington, Vol. 27, 1925, pp. 93-103. Each division equals .0108 mm.

The specimens from New York were sent to me for identification by Mr. M. D. Leonard of Cornell University.

Unless otherwise stated, the types are in the author's collection.

***Acerota leonardi*, new species.**

Male.—Length 1.23 mm. Length of head (dorsal view) 19, width 34; head rather roughly sculptured, scaly reticulate; lateral ocelli their width from the eye margin; pedicel a little less than twice as long as wide, longer and narrower than the third joint, which is slightly transverse; fourth joint nearly as long as the second and third united, a little wider than the third, slightly curved inwardly and rather sharply produced at apex on the inner side; joints five to ten subequal in length; joints seven, eight, and nine subequal, a little wider than long; tenth joint as long as the fourth, narrower, acute apically; sculpture on the thorax as on the head but much finer; length of thorax 40, width 31; length of anterior wing 95, width 40; wings slightly brownish; length of abdomen 55, width 24; length of second tergite 27; second tergite with two basal foveae, without distinct sculpture; black; antennae dark brown; coxae black; front legs light brown, the femora darker; middle tarsi and tibiae (except medially) light brown; posterior legs same color as middle pair.

Type locality.—McLean Bogs, N. Y.

One specimen collected by M. D. Leonard, May 16, 1925.

It gives me great pleasure to name this species after my friend, Mr. M. D. Leonard, of Cornell University.

This species is most closely related to *confusa* Ashm. The fourth antennal joint in *confusa* is about as long and as wide as the pedicel.

***Platygaster nigricoxa*, new species.**

Body black; anterior tibia basally and apically, middle tibia basally, and all tarsi, pale brown; length of head 23, width 40, height 35; frons shining, with a few distinct transverse carinae below, above these striae to the middle of the face finely transversely wrinkled; upper part of frons finely shagreened; occiput finely striate medially, shagreened laterally; length of thorax 55, width 40, height 35; length of thorax behind apex of tegula 21; notauli complete; mesonotum entirely shagreened; median lobe sharply pointed posteriorly, the tip nearly touching the scutellum; scutellum circular, feebly convex, shagreened on anterior half, polished posteriorly; wings hyaline; length of front wing

(measured from apex of tegula) 130, greatest width 52; length of longest cilia on front wing 3; cilia on hind wing one-fifth the greatest width of the wing.

Female.—Length 3.02 mm. Scape as long as the terminal five antennal joints, finely longitudinally striate above, beset with short white hairs; pedicel about twice as long as wide, nearly as long as the following two joints united; joints two to five subequal in width; third joint shorter than the fourth, closely joined to the fourth, about as wide as long; fourth joint slightly longer than wide, subequal to the fifth; sixth joint as long as the fifth but somewhat wider; joints seven to nine wider than the sixth, distinctly longer than wide, slightly produced outwardly at apex; joint ten longer than joint nine, one and one-half times as long as wide, subacute apically; length of abdomen 130; dorso-lateral ridges on first tergite distinct but not prominent; median area on first tergite smooth, somewhat depressed across the middle; length of second tergite 43, width 33; foveae deep and broad, extending to basal three-sevenths, with several distinct striae inwardly, the latter not reaching beyond the apices of the foveae; interfoveal area suddenly narrowed anteriorly, smooth, without sculpture; length of third tergite 12, width (anteriorly) 32; length of the fourth tergite 19, width 24; length of fifth tergite 28, width 15; length of sixth tergite 20, width 13; sixth tergite triangular, sharply pointed at apex; tergites three to six without sculpture.

Male.—Length 1.10 mm. Third antennal joint about as wide as long, narrower than the fourth, closely joined to the fourth; fourth joint slightly widened apically, less than twice as long as wide; joints six to nine distinctly longer than wide; joint ten about twice as long as wide, blunt at apex; length of abdomen 75, width 40.

Type locality.—San Francisco, California.

Description based on two females and one male sent to me for identification by Dr. E. P. Felt. The notes accompanying the specimens were as follows: No. A 2723. Reared from a gall on Lupine produced by *Dasyneura lupini* Felt and received from San Francisco, Calif., May 13, 1916.

Allotype and paratype in Coll. U. S. Nat. Mus., Cat. No. 28497.

***Platygaster pallida*, new species.**

Male.—Length 1.75 mm. Length of head 23, width 39; frons strongly granular, transversely aciculate medially; occiput separated from the vertex by a sharp carina; occiput traversed by numerous small carinae; lateral ocelli their diameter distant from the margin of the eye; pedicel about as thick as the fifth joint, thicker than the third or fourth, twice as long as wide, slightly longer than the third; third joint more than twice as long as wide, shorter than the fourth; fourth joint as wide as the third, about three times as long as wide, not excised basally; joints seven to ten a little longer than wide; ten less than twice as long as wide, conical; length of thorax 55, width 35; mesonotum finely shagreened; notauli complete, indistinct anteriorly; median lobe of mesonotum rounded posteriorly, extending nearly across the scutellar fovea; scutellum circular, somewhat roughened dorsally, the actual sculpture more or less ob-

scured by the presence of numerous fairly long white hairs; length of abdomen 84, width (at apex of second tergite) 41; lengths of tergites as follows: 10, 44, 10, 6, 5, 4, 5; second tergite very strongly striate to apical one-fourth, polished laterally and apically; following tergites polished, without sculpture; second sternite very strongly sculptured to apical one-fourth; wings hyaline, with cilia; body and appendages yellowish-brown; metapleura, propodeum, second abdominal segment except laterally and apically, and last segment entirely, dark brown.

Type locality.—McLean Bogs, N. Y.

One specimen collected May 16, 1925, by Mr. M. D. Leonard.

The general color of the body and the sculpture of the abdomen distinguish the species. The structure and vestiture of the scutellum is also somewhat unusual. The pubescent scutellum recalls forms in the genus *Amblyaspis* but the hairs are less dense and the fovea is deep.

Platygaster oenone, new species.

Female.—Length 1.35 mm. Length of head 17, width 32; frons mostly polished, with delicate aciculae laterally; antennal joints seven to nine very little longer than wide; length of thorax 40, width 27; mesonotum faintly shagreened; notauli distinct only posteriorly; scutellum short, circular, subconvex above, polished, sparsely pubescent, separated from the mesonotum by a deep constriction; length of second tergite 30, width 21; foveae short, shallow, a few striae extending past the middle of the segment; length of the third tergite 8, of the fourth 12, of the fifth 13, and of the sixth 11; width of the third tergite (at apex) 14, of the fourth 10, of the fifth 8; sixth tergite conical, acute apically; fifth tergite longitudinally striate medially; other tergites polished; wings hyaline; black; legs dark brown, the tibiae and tarsi lighter.

Type locality.—Revelstoke, Selkirk Mts.

Two females collected by J. C. Bradley, July 1, 1905.

Paratype.—In Coll. Cornell University.

This species is mostly closely related to *leguminicolae* Fouts. It differs in the structure of the antennae and the shape of the second tergite. In *leguminicolae* the second tergite is not distinctly longer than wide.

Hadronotus variicornis, new species.

Female.—Length 2.07 mm. Length of head 40, width 90; head deeply and broadly excavated posteriorly, the upper margin of occiput very sharp; frons reticulated with raised lines, the areas averaging in size one of the ocelli; spaces between the raised lines with a faint sculpture; lateral ocelli their diameter distant from the margin of the eye; pedicel about as long as the third antennal joint, a little over twice as long as wide, scarcely narrowed basally; third joint slightly narrower than the pedicel, as long as the two following joints united; joints four and five subequal, as long as wide; sixth joint as long as the fifth

but a little wider; joints seven to twelve forming a club, all of them, except the twelfth, transverse; last joint longer than wide, longer than the penultimate, acute at apex; length of thorax 75, width 82; mesonotum and scutellum reticulated like the frons but with the ridges higher; mesonotum without notauli; length of abdomen 85, width 83; length of the first tergite 17, of the second 30, and of the third 22; first tergite with many small longitudinal carinae and with eight larger ones; one of these carinae on each side of the center and those at the extreme edge of the segment somewhat larger than the others; second tergite with strong carinae on basal one-third toward the middle; apical margin of segment polished, without sculpture; otherwise the second tergite is granular with a few small wavy longitudinal carinae; third tergite sculptured like the second but with the polished band at apex wider; tergites four and five granular, polished on apical edges, the polished area wider medially; last tergite very short, arcuately excised posteriorly; black; antennae, except last five joints, brownish-yellow; club joints black; legs stramineous.

Type locality.—Blairmont Plantation, British Guiana.

Described from four females reared by H. E. Box, August 18, 1923, from Hemiptera eggs collected on bamboo leaves.

Type.—Cat. No. 28498, U. S. Nat. Mus. Paratype in Coll. Fouts.

This species is most closely related to *H. minimus* Kieffer. It differs principally in having the first tergite more than four times as wide as long.

***Spilomicrus kiefferi*, new species.**

Female.—Length 3.4 mm. Length of head 52, width 54; body polished, except metapleura, propodeum, and first segment of abdomen; antennae 14-jointed, longer than the head and thorax united; scape much less than half as long as the flagellum; pedicel and third joint subequal, the former a little wider at apex, about twice as long as wide; joints to the eighth becoming gradually shorter and wider, the eighth about as wide as long; following five joints forming a distinct club, all the joints, except the last, transverse; fourteenth joint a little longer than wide, conical, acute at apex; length of thorax 98, width 65, height 57; notauli briefly but sharply indicated posteriorly; scutellum with two deep and broad foveae at base; scutellum behind foveae flat, transverse; propodeum with a conical prominence at base; first tergite about as wide as long, with strong ridges laterally; length of second tergite 100, width 67; second tergite elevated at base, without foveae or incisions; wings subhyaline; marginal nervure reaching margin of wing a little before the middle, a little longer than wide, longer than the radius; black; antennae, except last five joints, dark reddish; club black; palpi stramineous; legs reddish-brown.

Male.—Length 3.0 mm. Length of head 50, width 58; antennae thirteen jointed, considerably longer than the whole body, all the joints longer than wide and of uniform thickness; scape somewhat longer than the last joint; joints 3–12 inclusive subequal in length and width; last joint a little longer than the twelfth, five times as long as wide, acute at apex; length of thorax 100, width

65, height 57; notauli longer than in the female, extending to the middle of the mesonotum; thorax otherwise as in the female; length of first tergite 35, width 17; first tergite with many more or less distinct longitudinal ridges; length of second tergite 87, width 52; abdomen distinctly longer than the thorax; color, except of the antennae, as in the female; scape dull red; pedicel yellowish-brown; flagellum rather dark brown.

Type locality.—Saranac Lake, N. Y.

Described from ten females and two males collected, August 26, 1916, at Saranac Lake, and from one female collected, April 24, 1925, at Ithaca, New York.

Type and paratypes.—Two females in Collection Cornell University; one female and one male in Collection United States National Museum, Cat. No. 28499.

This species is named in honor of the distinguished entomologist Dr. J. J. Kieffer.

***Cinetus pleuralis*, new species.**

Female.—Length 3.40 mm. Length of head 37 (.40 mm.), width 55; lengths of antennal joints: 40, 8, 24, 19, 19, 20, 17, 16, 15, 14, 14, 14, 13, 13, 16; all joints subequal in width, the third about five times as long as wide; second joint a little longer than wide, slightly wider than the scape; fifteenth joint blunt at apex; pubescence on antennal joints about as long as the joints are wide, semi-erect; length of thorax 90, width 56; carina on propodeum not divided; length of first tergite 40, width 14; first tergite of uniform width, with four longitudinal ridges, the two toward the center larger than the others; toward the apex are several small carinae between the ridges; length of second tergite 78, width 50; radial cell closed, about as long as the marginal vein, approximately three times as long as wide; marginal vein as long as the basal; head black; scape rufous; second and third antennal joints brown; flagellum piceous; thorax black, the pronotum and the venter rufous; petiole black; abdomen saffron-yellow except laterally where it is dark brown; legs yellowish-brown, the posterior tibiae and all tarsi somewhat darker.

Male.—Length 2.80 mm. Length of head 37, width 52; antennae rather long, filiform, with pubescence as in the female; lengths of antennal joints: 30, 6, 26, 20, 20, 19, 19, 18, 18, 18, 17, 16, 15, 18; third joint very deeply excavated on basal two-thirds, the cavity formed being deeper than the fourth joint is wide; width of third joint just behind the excavation 6; second joint slightly longer than wide, a little wider than the fourth joint; joints four to fourteen becoming gradually narrower; length of thorax 85, width 56; length of petiole 40, width 14; petiole sculptured as in the female; length of second tergite 76, width 53; scape yellowish, brown on the outer side toward apex; third joint yellowish, fuscous on the outer side; rest of antennae piceous; thorax colored as in the female; about half of second tergite (basally) and large spot medially on second sternite, saffron-yellow; abdomen otherwise black.

Type locality.—McLean Bogs, N. Y.

Two specimens collected by M. D. Leonard, May 16, 1925.

This species is closely related to *californicus* Ash. The abdomen in the latter species is uniformly dark brown. I have examined the type of *californicus* and find that it is a female.

***Belyta robustior*, new species.**

Female.—Length 3.70 mm. Length of head 63, width 56; pedicel as long as wide, a little over half as long as the third joint, as wide as the third; last joint as long as the third; pronotum narrowed neck-like anteriorly, not bulging outward laterally, with a median groove; pronotum a little over one-third the length of the mesonotum; median carina on propodeum divided at middle; lateral areas not sculptured; posterior angles more or less prominent, subacute; length of first segment 37, width 27; first tergite smooth, with four well defined longitudinal carinae; length of second tergite 100, width 74; median sulcus extending to basal third; a few short grooves on either side of the median sulcus; total length of abdomen 174; radial cell slightly longer than the marginal vein; black; palpi yellow; antennae rufous; legs reddish-yellow; wings brownish.

Type locality.—Glen Echo, Maryland (Coll. Fouts).

Described from one specimen from Glen Echo labelled, "June 5, 1921," and one specimen labelled, "Ithaca, N. Y., July 9, 1904."

Paratype.—In Coll. U. S. Nat. Mus., Cat. No. 28500

AN ADDITION TO THE SAPROMYZIDÆ OF THE DISTRICT OF COLUMBIA (DIPTERA).

BY J. R. MALLOCH, *U. S. Biological Survey*.

In the Proceedings of the United States National Museum, Vol. 65, 1924, the writer, with W. L. McAtee, published a list of Sapromyzidae of the District of Columbia which contains records of 49 species. To this list may now be added *Sapromyza rotundicornis* Loew which was taken by the writer at Glen Carlyn, Va., in May, 1925. This species is essentially a northern one, occurring in New England and the Northwest, and its occurrence here is exceptional.

Actual date of publication, October 1, 1925.

EDITORIAL.

What's in a name? 'Tis but a symbol, a tag tacked to a thought or a thing. How much then or how little shall it bind us? May we not be arbitrary with what is often arbitrarily fashioned and, in first instance, was arbitrarily applied; or must we respect the symbol as something sacred, something fixed as to application and limited in implication, something that may be accepted or rejected but, if accepted, may not be capriciously employed? Your modernist will answer quickly enough (he always has a ready if not a reliable answer):

“Let us have freedom in our symbols. Let them be elastic rather than rigid, capable of readjustment, transmutation even. Stretch your tags (they are poor things anyway and hardly fit, however applied). Shift them with the shifting of fancy. If I call an earthworm an insect, what harm? I change no facts regarding earthworms or—what some people call insects. I have merely carried over a whole term for a fragment of its meaning. I have made a yard stick elastic.”

Exactly! But, one might ask, how is one to measure with an elastic yard stick? What does it mean now to say, “six inches by the yard stick.” And how is one to know what you are talking about when you use the word insect? There's the rub. Names, symbols, are tags absolutely essential to the transmission of thought. They are its medium of exchange. Debase the medium and you go bankrupt. Confuse the tags and you frequently obscure the thought. Certainly you make its transmission difficult if not impossible. If you have any doubts about this, read over the articles of the recent defenders of evolution, and please tell me what they are defending. Ask an “advanced thinker” to define what he means by “evolution” (distinguishing evolution, change, growth and development). Ask a popularizer of science to define what he means by “science”; a liberal to define what he means by “liberalism”; or a modernist to define anything. If he does so, ask him to define his definition. (Don't ask him to stick to it. That is too big an order for a philosopher who is accustomed to philosophy without logic.) Then dispute, if you can, the sacrosanct nature of the symbol or the self-evident truth of the proposition, that a word applied in two meanings at the same time means nothing.

And how does all this pertain to Entomology?

Well, there is such a thing as nomenclature, which is something in the way of being a science of symbols, and which, because of our sinning with symbols, has become also something of a nuisance.

—*Carl Heinrich.*

NOTES AND NEWS ITEMS.

Zoological Record—Part Insecta.—The “Insecta” part of the “Zoological Record,” (as distinguished from the complete volume) will in future be published by, and only obtainable from, the Imperial Bureau of Entomology. The price for the part will be 15/-, as heretofore. It is, however, proposed as an experiment to break up a limited number of copies into the following sections, which will be sold as follows:—

Section A. List of Titles and Subject Index	4/-
Section B. Coleoptera	6/-
Section C. Lepidoptera	6/-
Section D. Hymenoptera and Diptera	4/-
Section E. Hemoptera, Orthoptera and remaining Orders .	4/-

The above division has been instituted for the benefit of those entomologists who are interested in a portion only of the systematic part of the work. It is in the nature of an experiment only and can not be continued unless it is widely supported.

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PROCEEDINGS
OF THE
ENTOMOLOGICAL SOCIETY
OF WASHINGTON

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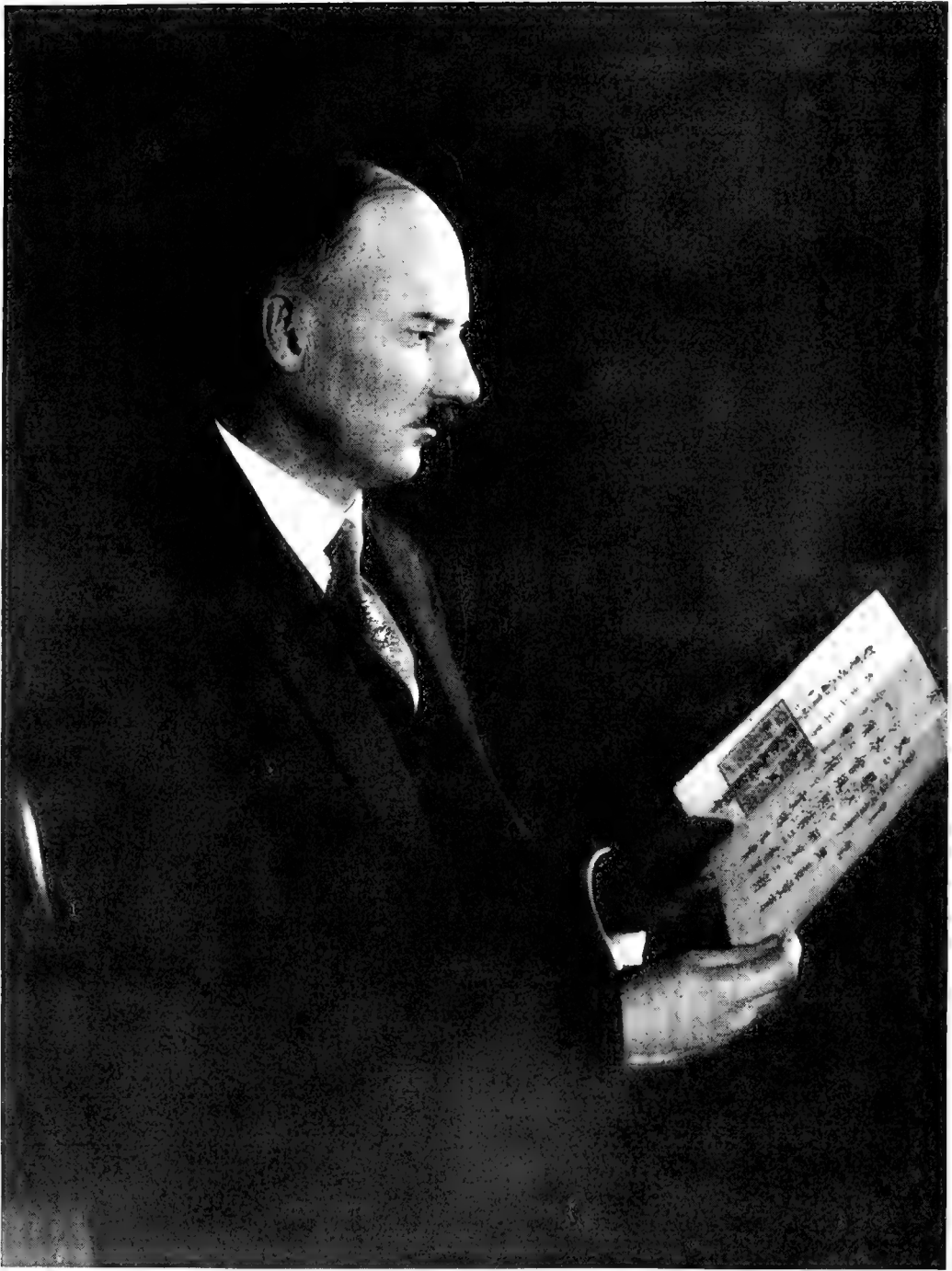
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BRAYTON HOWARD RANSOM

PROCEEDINGS OF THE
ENTOMOLOGICAL SOCIETY OF WASHINGTON

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In Memoriam

The following resolution was adopted by The Entomological Society of Washington on October 1, 1925:

Dr. Brayton Howard Ransom, Chief of the Zoological Division of the Federal Bureau of Animal Industry and for many years a member of the Entomological Society of Washington, died September 17, 1925, at the age of forty-six years. In his investigations in the broad field of animal parasitology, Dr. Ransom made frequent contributions to the subject of medical and veterinary entomology. His publications which have a direct bearing on Entomology include a wide range of subjects, such as: habits and biology of the Texas fever tick; arsenical dips for ticks; eradication methods for ticks; a nematode parasite of the house fly and certain dung beetles; miscellaneous cattle parasites; and sheep scabies. Perhaps his most comprehensive paper on insects is that published in Pierce's Sanitary Entomology. This paper deals with the relation of insects to the parasitic worms of vertebrates. The studies of arsenical dipping for the control of ticks conducted by Dr. Ransom and his collaborator, H. W. Graybill, are basic investigations of great economic importance.

Dr. Ransom was a man of great modesty and personal charm, a delightful friend and companion and a man of sound judgment and conservative ideas. His advice and counsel were highly prized by his associates and collaborators. His death at such an early age is a loss to Science and his friends. The Entomological Society of Washington regrets the loss of this active worker and wishes to record its sincere appreciation of the man and the scientist.

PYCNOSELUS SURINAMENSIS LINNÆUS (ORTHOPTERA); ON ITS NYMPHS AND THE DAMAGE IT DOES TO ROSE BUSHES.BY A. N. CAUDELL, *U. S. Bureau of Entomology.*

The male of *Pycnoscelus surinamensis* Linn. has been recorded from the United States from a single specimen only, a winged individual taken in the Zoological Park in New York by W. T. Davis.¹ With this single exception the several hundred specimens of this roach recorded from America are females. Hebard, in his review of the United States Blattidae, mentions having examined over one hundred specimens from the United States and almost twice that number from other regions, chiefly Mexico and the West Indies, without finding a single male, either adult or immature. Davis also notes that the sixty-six adults in his collection are all females and all specimens in the National Museum are of that sex.

In looking over some fifty or more nymphs of this species I find many which might readily be mistaken for males; in fact I did this, and for a time was convinced they were of that sex, but was converted to the opposite view by Mr. Hebard. Dissections of dry and alcoholic material were made and the male-like individuals proved to be of early instars, the pseudo-male characters disappearing in the last nymphal instar. These early stage male-like nymphs are all smaller than those in the stage preceding maturity, but can generally be distinguished from the more typically female last instar nymphs by a casual examination of certain external characters. The younger nymphs have seven visible ventral abdominal segments. The apical segment extends laterally no farther than the bases of the cerci and the apical margin is mesially briefly notched at the termination of an almost or completely closed longitudinal slit which extends about one-half the length of this plate; on each side of this plate is a pointed subcylindrical style which is about three times as long as its basal width. In the last instar nymph only six ventral abdominal segments are visible, the apically incised terminal plate together with its pair of styles having wholly disappeared. This emphasizes the profound change which is undergone in the transition of the preultimate to the ultimate instar.

In a very few cases the small nymphs have the preapical sternite broadly rounded apically, instead of being transverse or slightly concave as usual, and almost or quite concealing the terminal plate. Such specimens, except for their usually smaller size, resemble almost perfectly the last stage nymphs; but in such cases the concealed terminal plate, which is less chitinized than when more fully exposed, may be seen by looking carefully beneath the covering segment from behind.

¹1919. Proc. N. Y. Ent. Soc., vol. xxvii, p. 108-109.

The ovipositor of the last stage nymph, which may be seen by raising or removing the apical ventral segment,¹ has the upper valves membranous, about three times as long as broad, the sides parallel and the tips broadly rounded; the lower valves are shorter and narrower. Posterior to and a little laterad of the ovipositor is a pair of subquadrate flaps which are apically and outwardly broadly concave and with a laterally directed tooth-like expansion on the outer margin at the apex. These flaps are thin and wholly membranous, and so inconspicuous as to be rather easily overlooked unless the observer knows of their presence; they are indicated in the accompanying figure 2 by the letter F, and may represent the lost seventh segment of the younger nymph as noted above.

In the earlier stage nymphs, lying above the base of the last ventral segment and wholly concealed by the preceding one, is the ovipositor, consisting of a pair of soft fleshy elongate flaps.

In all instars there is a pair of scarcely chitinized, but rather firm, thick plates beneath the supraanal plate, or last tergite. These plates are broadly notched apically and bear a few microscopic brown hairs. In nymphs of the last instar these plates lie next the ovipositor while in nymphs of earlier stages the style-bearing plate intervenes between them and the ovipositor. The accompanying figures illustrate the characters noted.

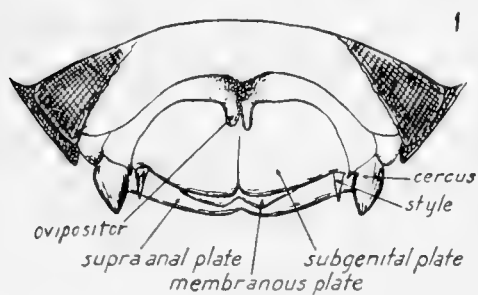


Fig. 1.

Pycnoscelus surinamensis Linn.

Tip of abdomen of early stage nymph, ventral view with segment preceding the last one, or subgenital plate, removed.

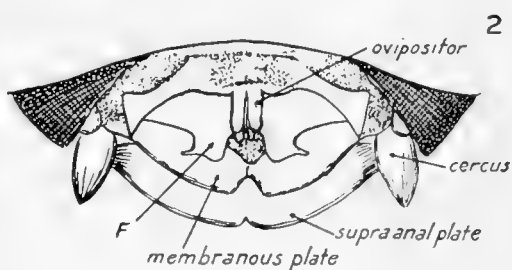


Fig. 2.

Pycnoscelus surinamensis Linn.

Tip of abdomen of last instar nymph, ventral view with terminal plate removed.

An interesting case of injury to rose bushes by this roach was reported by J. E. Koppelman, a florist of Providence, R. I. Under date of April 7, 1924, he wrote to the U. S. Bureau of Entomology that beetles were destroying his rose bushes, especially young plants, by eating the bark from the stems a

¹Ordinarily in describing the genital organs of roaches the insect is presumed to be lying on its back, the position in which examinations are most readily made. Thus the positions mentioned in descriptions are usually opposite to those when the roach is in its natural position.

couple of inches beneath the surface of the ground. Specimens of the insect were submitted for determination and the supposed beetles turned out to be immature specimens of *Pycnoscelus surinamensis*. About twenty specimens were received, representing last stage nymphs and ones of earlier instars in approximately even numbers. They were kept alive in jars of soil for some time but unfavorable conditions ultimately caused all to die. When placed in a jar it was interesting to see them burrow immediately out of sight into the soil, in striking contrast to the behavior of ordinary roaches.

This roach has been reported from greenhouses for many years but its doing serious damage to rose stems seems to be a recent development, the first account of such damage being that by M. P. Zappe in 1918,¹ since which time there have been a number of similar instances noted. The last report was from the Florex Gardens of North Wales, Penna., where the roaches chewed off the bark of mature rose canes from a point well underground to a distance of several inches above ground. Thus this insect is fast becoming a pest with which rose growers will have to contend. The damage so far reported has all been done in greenhouses, but in our Southern States there appears no reason why it should not also work outdoors.

Since the above notes were written the roach in question has been reared from medium sized nymphs, through the stage preceding maturity and on to the adult form. A number of specimens were thus brought to maturity and all proved to be females. These bred specimens were kept isolated, both before and after maturing, and several produced young in from 37 to 101 days after attaining maturity, thus proving the long suspected fact that this species is parthenogenetic.

These breeding experiments verify the observations recorded in the above article. The number of nymphs in this species varies from 11 to 38 in several cases observed, though it is probable that the lesser number is due to some failing to emerge. That there may be more than the maximum here noted is shown by an ootheca removed from the abdomen of a specimen 64 days after maturing; this ootheca contained 48 eggs and filled the entire abdominal cavity, being 14.5 mm. long by 4.5 mm. broad, slightly curved and of a yellowish-white color. This shows the fully developed egg to be at least 4 mm. long. Eggs from the abdomen of a specimen which has just given birth to young are found in a bunch, but not inclosed in an ootheca; they are yellowish-white in color, slightly curved and vary from 1 to 2 mm. in length. The ootheca is rarely, if ever protruded from the abdomen of the roach. A young lady who attended

¹Bull. Conn. Exp. Stat., No. 203, p. 202-213.

the rearing experiments during a brief absence of the writer reports having seen a specimen with an ootheca protruding, but this observation needs verification.

The stage preceding maturity, that in which the female characters develop as detailed in the first part of this article, extends over a period of from 24 to 65 days in several cases definitely observed in the above rearing experiments. The duration of earlier stages was not determined.

These roaches are easily reared in cloth-covered glass jars containing a little soil in which they can burrow. The jars should be kept moderately moist and never allowed to completely dry out for any length of time. These roaches thrive on lettuce leaves, the only food used in the above rearings.

The young nymphs, when suddenly disturbed, often "play possum" for a brief period. They swim rather well, sometimes on the back but mostly back upwards. They will sit on a partly submerged bit of debris with just the tip of the abdomen projecting above the surface of the water; if completely emersed they remain quiet for a short time and then release their hold and rise to the surface.

A TENTATIVE ARRANGEMENT OF THE MUSCOID FLIES BASED ON THE PUPARIA.

BY CHARLES T. GREENE, *U. S. Bureau of Entomology.*

This tentative grouping of the muscoid flies correlates characters of the puparium with those of the adult, and is based on a study of about 400 species representing the families Tachinidae, Dexiidae, Sarcophagidae, Oestridae, Calliphoridae and Muscidae (this last including the Anthomyiidae). The principal adult character used is the arista of the antenna, whereas that of the puparium is the posterior spiracular plate. Both of these characters appear to be constant for a species.

The puparia may be divided into family groups and species on characters which, for the material available, are very satisfactory, but so far it has been impossible to find characters by which the puparia can be separated into genera. Certain few heterogeneous groups between the family and species can be defined but from this study of the puparia it would seem probable that too many genera have been made for the adults.

A large proportion of the species are parasitic in the larval stage and many others are simply scavengers. For convenience I have given a brief outline of the larval habits under each family. The plate shows the families arranged in tabular form with the drawings conventionalized but these show the characters very distinctly and may be easily used for purposes of determination. In all cases the right spiracular plate is drawn. The general treatment of the puparia is given under

each family. The puparium of all the species herein treated is formed from the larval skin.

The family Oestridae shows a very distinct form and for convenience I have placed it between two families which are quite distinct but exhibit a marked similarity of habits. The order of the arrangement of the families is similar to that used by the taxonomist in general but has no particular significance.

TACHINIDAE.

Adult with arista bare.

Puparium with the posterior spiracular plates either depressed slightly below the surface or placed at the apex of a protuberance which varies in length; each spiracular plate with two or more slits and always with a definite button. The location of the spiracle and the number of slits is constant for each species.¹

Larvae rather smooth; parasitic on other insects.

DEXIIDAE.

Adult with arista plumose.

Puparium like that of Tachinidae except that the spiracular plate always has three slits.

Larvae more rugose than those belonging to the family Tachinidae.

There is no distinct division between these two families; the adults are usually more slender and have longer legs.

GROUP A.

Adult with arista bare.

Puparium with a definite posterior cavity; spiracular plates located on the upper half of this cavity; each plate with three slits and always with a definite button.

Larvae like those of Tachinidae except in having the posterior cavity.

This group includes six genera: *Amobia*, *Amobiopsis*, *Hilarella*, *Metopia*, *Pachyophthalmus* and *Senotainia*. The adults in this group resemble those of the Sarcophagidae in appearance, but on account of the bare arista and the definite button on the spiracular plate, I consider them more closely related to the Tachinidae.

SARCOPHAGIDAE.

Adult with arista plumose basally, the apical third or more bare.

Puparium with a definite posterior cavity, with or without tubercles around the edge; spiracular plates located on the upper half of this cavity; each plate has three slits, always without a button.

¹An Illustrated Synopsis of the Puparia of 100 Muscoid Flies (Diptera) by C. T. Greene, Proc. U. S. Nat. Mus., vol. 60, 1921, Article 10, No. 2405, pp. 1-39, pls. 1-20.

The number and arrangement of the tubercles around the posterior cavity is constant for a species.¹

Larvae covered with minute spines; always with a posterior cavity having tubercles around the edge.

The larval habits are variable. Many species feed on carrion and some species feed on decayed vegetation, dead insects and dead mollusks. One species of *Sarcophaga* is found in the alimentary tract of man. The larvae of *Wohlfahrtia* have been found several times under the skin of infants and under the skin of several species of the lower vertebrates.

Several species, which have the arista bare, are included in this family, but nothing is known of their immature stages. I rather surmise that when the early stages of these are known they will fall in the preceding group A, which has the button on the spiracular plate.

OESTRIDAE.

Adult with arista bare, pectinate or plumose.

Puparium with a fold or depression at the posterior end; spiracular plates located in this fold or depression; each plate is either punctate or has three or more slits, and is with or without a button.²

Larvae with numerous heavily chitinized dermal appendages, which vary in number in the different genera. The larvae are parasitic on warm-blooded animals.

The available larvae belonging to this family may be divided into three groups on the character of the integument and the presence or absence of a button on the spiracular plate. In a general way these groups of the larvae correspond to the structure of the adult arista. The accompanying plate correlates the characters of the arista with those of the larvae and below is a list of the species belonging to each group.

GROUP A.

Adult arista bare. Larva with button present in the spiracular plate; dermal appendages spinelike.

Oestrus ovis Linné. The larvae are found in the frontal sinuses of the sheep.

Cephanomyia macrotis Brauer. The larvae are found in the throat of *Cervus macrotis*.

Cephanomyia cooki Townsend. The larvae are found in the throat of hogs.

A third species (no name given) has been reported to have been taken from a man's head.

¹The Puparia and Larvae of Sarcophagid Flies by C. T. Greene, Proc. U. S. Nat. Mus., vol. 66, 1925, Article 29, pp. 1-26, pls. 1-9.

²In the genus *Gastrophilus* the button is rather weak, but in the other forms it is either well developed or absent.

Hypoderma lineatum DeVillers. The larvae are found under the skin, on the back, of cattle.

Oedemagena tarandi Linné. The larvae are found under the skin of the reindeer.

Rhinoestrus nivarleti Rodhain and Bequaert. The larvae are found in the sinuses of a wild pig (*Potamochoerus porcus* Linné) of the African forest.

Gastrophilus equi Clark. The larvae are found in the stomach of the horse.

Gastrophilus haemorrhoidalis Linné. The larvae are found in the stomach, duodenum and rectum of the horse.

Gastrophilus nasalis Linné. The larvae are found in the duodenum and about the pylorus of the horse.

GROUP B.

The adult arista is pectinate. Larva with button absent in the spiracular plate; dermal appendages either cone-shaped (style a of plate) or scale-like (style b of plate).

The following species have very large, cone-like dermal appendages (style a):

Cuterebra americana Fabricius, a parasite on the jack rabbit.

Cuterebra buccata Macquart, a parasite on the striped squirrel, cats and in the throat of *Neotoma* sp.

Cuterebra cuniculi Clark. The National Collection has a larva found under the skin of a dog at Philadelphia. Larvae of this species have also been found in hares and rabbits from various states and have also been recorded from mice.

The following species has large, flattened, scale-like dermal appendages (style b):

Cuterebra baeri Shannon and Greene. The larvae of this species infest the red howling monkey (*Alouatta* sp.), the infestation being mainly around the throat. The specimens in the National Collection were collected at Kartabo, British Guiana, by Professor Alfred Emerson and at Darien, Panama, by the late J. L. Baer. Certain of these emerged from a monkey July 12, 1924, pupated on the 13th and the adult emerged July 22, 1924.

GROUP C.

Adult arista pectinate.

Puparium. I do not have any specimens of this genus.

The larva is rather distinct in form, having the anterior portion quite slender and neck-like, while the posterior portion is quite globular; the large spines are located on this globular portion; each spiracular plate has three parallel slits and lacks the button.

Dermatobia hominis Linné. The larvae are found under the skin of man, monkeys and dogs.

CALLIPHORIDAE.

Adult arista plumose with the apical fourth bare; the body of the adult is usually a metallic blue or green.

The puparium exhibits three forms; in all of these the spiracular plate is usually small, and is located either slightly below the surface of the puparium or raised decidedly above the surface, but never tuberculate; each plate has three slits and a button.

Section 1.—Puparium smooth, posterior end rounded, with upper half slightly oblique. In *Chrysomyia* there is a transverse fold on the posterior end.

The majority of the puparia of this family belonging to this section and this section includes the majority of the puparia found in the genus *Chrysomyia*.

Protocalliphora belongs to this group and is parasitic on nestling birds.

Section 2.—Puparium smooth, with the posterior end slightly depressed; spiracular plates located in this depression.

The genus *Philornus* belongs here and is parasitic on nestling birds.

Section 3.—Puparium smooth, with pointed tubercles arranged in rows, and with the posterior end slightly oblique.

Several of the Australian species of *Chrysomyia* constitute this form and are troublesome in the sheep-growing section.

The majority of the larvae belonging to the Calliphoridae are scavengers in carrion and decayed material. In the genus *Chrysomyia* the larvae are often found in infected sores, and and they are also troublesome in the sheep-growing sections. The parasitic genera are mentioned under sections 1 and 2.

The families Calliphoridae and Sarcophagidae are very similar in the form of the adult arista, and in the larval habits, but may be easily distinguished by characters found on the larva and puparium. So far as known the parasitic forms of Calliphoridae parasitize only nestling birds, whereas the Sarcophagidae parasitize insects and higher animals but never the birds.

MUSCIDAE.

(Including ANTHOMYIIDAE.)

Adult arista bare, pubescent, pectinate or plumose.

The puparium exhibits four different forms, all of which have the spiracular plates raised above the surface; each plate has three slits and a button.

Section 1.—The adult arista exhibits all four styles.

The puparium, which I call the "general form," has the posterior end slightly oblique, with the spiracle, fig. 1, slightly raised above the surface and located on an oblique surface.

The common house-fly, *Musca domestica* Linné, the stable-fly, *Stomoxys calcitrans* Linné, the horn-fly, *Haematobia irritans* Linné, and the cluster-fly, *Pollenia rudis* Fabricius, belong to this section.

The larvae breed commonly in manure, human excrement and sometimes in decayed vegetation.

A few species in the genus *Pegomyia*, which also belong to this section, are leaf miners. *Hylemyia cilicrura* Rondani mines in the stems and roots of cabbage, radish, beans, onions, beets, potatoes and hedge mustard.

Section 2.—Adult arista, style a.

The puparium has the posterior end oblique, deeply depressed; posterior spiracles, fig. 2, slightly raised above the surface and located in this depression.

The larvae breed commonly in cow manure.

Morellia micans Macquart belongs to this section.

Section 3.—Adult arista, style c.

The puparium has both ends truncate; posterior spiracles, fig. 3, decidedly raised above the surface.

The larvae breed commonly in decayed vegetation.

Atherigona pulvinata Grimshaw belongs to this section.

Section 4.—Adult arista, style c.

The puparium has the form of the larva; there are pointed processes arranged in a single row on the lateral edge, and a double row in the middle of the dorsum; posterior spiracles, fig. 4, decidedly raised above the surface, and located on the dorsum of the last segment.

The little house-fly, *Fannia brevis* Rondani, belongs to this section.

Most of the larvae of the family Muscidae are scavengers, but a few species, which are noted under their particular section, are leaf and stem miners.

EXPLANATION OF PLATE 10.

Diagram showing a comparison of the adult arista with the type of puparium and the spiracular plate of the puparium. Wherever more than one type of arista is found in any family the variations or differences in the puparium or the spiracular plate, which are correlated with these different types of arista, are designated by the same letter.

**THE SYNONYMY AND GENERIC POSITION OF TWO NORTH
AMERICAN ICHNEUMON-FLIES.**

BY R. A. CUSHMAN, *U. S. Bureau of Entomology.*

In the *Canadian Entomologist*, vol. 57, 1925, p. 104, Viereck takes issue with Cushman and Gahan's treatment of *Banchus fugitivus* Say.¹ He contends that *Limneria guignardi* Provancher and *L. oedemasiae* Ashmead, synonymized by Cushman and Gahan with *fugitivus*, can not be synonymous with that species because they spin their cocoons within the skin of the host caterpillar, whereas Say's species spins a naked cocoon; because *guignardi* and *oedemasiae* have the abdomen gradually clavate, not "abruptly clavate" as in *fugitivus*; and because Provancher's and Ashmead's species have the posterior tibiae white at extreme base, not black.

The first reviser of the species was Riley², who identified as *fugitivus* certain parasites of *Euchaetes egle*. The specimens on which this determination was probably based are in the National Museum, and, in my opinion, are conspecific with a homotype (Gahan) of *guignardi* Provancher, with the types of *oedemasiae* Ashmead, and with specimens reared from various species of *Malacosoma* and *Anisota*. In connection with the above named hosts the name *fugitivus* has been placed in print many times, in both taxonomic and economic literature; and I believe that this interpretation of the name should be preserved unless much stronger evidence that it is erroneous is presented than that brought forward by Viereck.

In the first place, I believe that Say's description is based on two species, for he says "in the male the white of the posterior tibia is less obvious," which is certainly not true of any species of the group known to me, though the reverse is sometimes true.

A careful perusal of Say's description will show that he did not specify which of his specimens came from the maculated cocoon or of which sex was this specimen, but "I obtained *a specimen* (the italics are mine) from a very pretty cocoon which is somewhat cylindrical, white with two maculated black bands." He did not know from what sort of cocoon his other specimen or specimens came.

Say's description of the shape of the abdomen is as follows: "abdomen arcuated; towards the tip rather abruptly clavate." In dorsal aspect *fugitivus* in the sense of Riley does not have the abdomen "abruptly clavate," nor is the abdomen "arcuated"; but in profile it is both "arcuated" and "rather abruptly

¹Proc. Ent. Soc. Wash., vol. 23, 1921, p. 159.

²First (1869, p. 139) and Fourth (1872, p. 41) Annual Report on the Insects of Missouri.

clavate," and it is obviously in profile that Say was describing it.

As for the black base of the hind tibia Say says, "posterior tibiae white with black tip and base." It would not be at all surprising if Say had overlooked the fact that the extreme base of the tibia in his specimens was white, which he almost certainly did, for I know of no species of "*Limmeria*" possessing an annulated tibia in which the extreme base is not white.

Except for the almost certainly non-existent difference in the color of the hind tibia, Riley's parasite of *Euchaetes egle* disagrees in no way with Say's description.

There exists, as I see it, no necessity for changing, and for the following reasons I believe it unwise to change the meaning of *fugitivus*, and decline to follow Viereck in his interpretation of the species: the name of *fugitivus* has appeared repeatedly in the literature of several important and often referred to economic insects, and in this connection has become almost as widely well known as the host insects; in this sense the species fits the original description, with one minor difference that probably does not exist; in this sense also the species is represented by specimens in many museum and private collections; and the genus *Ameloctonus* Foerster (with *fugitivus* as type by fixation of Viereck himself) is typified by a well-known species. If, on the other hand, the course suggested by Viereck be followed one would have always to remember that in economic and taxonomic literature up to 1925 *fugitivus* does not mean *fugitivus* but *guignardi*; the species would not, for the present at least, be represented by identified specimens; and the genus *Ameloctonus* would be unrecognizable.

So convinced am I that my course is the wiser one that I venture to designate a neotype of *fugitivus* as follows:

***Hyposoter fugitivus* (Say).**

Synonymy as given by Cushman and Gahan, Proc. Ent. Soc. Wash., vol. 23, 1921, p. 159.

Neotype.—A female specimen from the collection of C. V. Riley, reared from *Euchaetes egle* Drury, and now in the collection of the U. S. National Museum.

Viereck's paper causes considerable confusion from the generic standpoint. Viereck himself has fixed the genotypes of *Horogenes* and *Hyposoter* by referring a single species to each and of *Ameloctonus* and *Anilastus* by selection, while *Hypothereutes* and *Ischnoscopus* are monobasic on Ashmead's inclusion of species. As pointed out by Viereck, Gahan has synonymized the last four with *Hyposoter*. While not stating whether he accepts or rejects this synonymy, Viereck synonymizes *Hyposoter* with *Horogenes*. But *Horogenes* has as its genotype by Viereck's own designation *Limmerium (Horogenes) discoocellellae* Viereck,

which is an *Angitia*. *Horogenes guignardi* (Prov.) is not congeneric in the strict sense with *Horogenes discoocellellae* Viereck. The next oldest generic name of the series is *Hyposoter*, and to this, for the present at least, *guignardi* must be referred.

Horogenes (Foerster) Viereck = *Angitia* Holmgren.

As for the relative value of the existing generic names in this group it appears to me that this is a matter of personal opinion and convenience.

In "The Cresson Types of Hymenoptera" (Memoirs Am. Ent. Soc., No. 1, 1916) Cresson did not indicate which of the two specimens, representing opposite sexes, should be considered the holotype of *Limneria rivalis*. His statement "♂ abdomen gone" is not to be taken as type selection, for he is here merely quoting from Crawford and Rohwer's statement regarding the condition of the Cresson types in the National Museum. Inasmuch as the two specimens are not of the same species it is highly important that one be designated as the holotype. Since the first characters mentioned in the original description by which the sexes are said to differ are of the female, and since the male is that of *Hyposoter pilosulus* (Provancher), a species widely published in taxonomic and economic literature, it seems best that the female be selected as the holotype. This is hereby done. Both specimens are in the National Collection and both lack the abdomen.

Because of its convergent eyes *rivalis* is referable to the genus *Cymodusa* Holmgren, of which it is by no means a typical example, since the eyes are apparently hairless and the convergence of the eyes is much less marked than in such species as *distincta* (Cresson). The following is the corrected synonymy:

***Cymodusa rivalis* (Cresson).**

Limneria rivalis Cresson, Trans. Am. Ent. Soc., vol. 4, 1872, p. 161, ♀ not ♂.

***Hyposoter pilosulus* (Provancher).**

Limneria rivalis Cresson, Trans. Am. Ent. Soc., vol. 4, 1872, p. 161, ♂ not ♀.

Limneria pilosula Provancher, Add. Faune Ent. Can. Hym., 1889, p. 89, ♀ ♂.

Limnerium pilosulum Dalla Torre, Can. Hym., 1901-1902, p. 101.

Limneria ephestiae Ashmead, Trans. Am. Ent. Soc., vol. 23, 1896, p. 195, ♀ ♂.

Limnerium ephestiae Dalla Torre, Cat. Hym., 1901-1902, p. 95.

Amorphota perrivalis Viereck, Trans. Kans. Ac. Sci., vol. 19, 1905, p. 307, ♀.

Campoplex (Ameloctonus) pilosulus Viereck, Hym. Conn. (1916), 1917, p. 267.

Campoplex (Ameloctonus) pilosulus Tothill, Can. Dept. Agr. Bull. 3, n. s. tech., 1922, p. 59-74, pl. 3, fig. B, pl. 5, figs. 29-35, 37-57.

The above synonymy is based on the allotype of *rivalis*, a homotype (Gahan) of *pilosulus*, the types of *ephestiae*, and a homotopotype of *perrivalis*, all of which are in the National Collection.

A NEW ENCYRTID PARASITIC IN THE EGGS OF MONEILEMA
(HYMENOPTERA: CHALCIDOIDEA).

BY A. B. GAHAN, *U. S. Bureau of Entomology.*

The egg-parasite described below was reared in connection with the prickly pear insect investigations being carried on by the Commonwealth of Australia at Uvalde, Texas, and was sent to the Bureau of Entomology for identification by Mr. A. P. Dodd.

Ooencyrtus moneilemae, new species.

This species has the mesoscutum less strongly sculptured than any of the other American species and it also differs from all of them in that the legs including all coxae are pale reddish testaceous.

Female.—Length .83 mm. Head as broad as thorax; frontovertex moderately broad, approximately twice as long as broad, weakly reticulate and slightly shining; ocelli in a nearly equilateral triangle; eyes faintly pilose, diverging anteriorly; scape slender; pedicel almost twice as long as thick at apex; first funicle joint about half as long as pedicel and somewhat longer than broad; second funicle joint usually very slightly longer than the first, joints 2 to 6 subequal in length but successively increasing very slightly in thickness, the sixth subquadrate; club ovate, about equal in length to the three preceding funicle joints and nearly twice as thick as last funicle joint; mesoscutum broader than long, very faintly reticulated, nearly smooth and shining, sparsely set with evenly distributed short fine hairs; scutellum basally sculptured like the mesoscutum, the apical half smooth and highly polished; mesopleura weakly reticulated; stigmal vein very slightly longer than marginal, the latter about as broad as long; disk of wing uniformly ciliated but with a distinct hairless line extending obliquely inward and backward from the stigmal vein nearly to the posterior margin but closed before reaching the margin; abdomen broader than long, subtriangular, not longer than the thorax and faintly reticulated dorsally. Head and thorax black with a very slight bronzy tinge in some lights; abdomen blackish apically and laterally, the base and middle brownish-testaceous above and below; antennae dark brownish-testaceous or fuscous; legs including all coxae pale reddish testaceous; wings uniformly slightly fuscous, venation dark brown.

Male.—Length .6 mm. Similar to the female but the antennae more distinctly hairy, the funicle joints subequal and submoniliform, the first as long as pedicel and twice as long as broad, the second and following subequal in length to the first but a little broader; club solid, about as long as two preceding joints and scarcely thicker than funicle; abdomen entirely black or at least not conspicuously paler at base.

The pale spot at base of female abdomen is somewhat variable in extent, being reduced to a pale transverse basal band in some cases.

Type locality.—Uvalde, Texas.

Type.—Cat. No. 28520, U. S. N. M.

The type female and five paratype females reared by A. P. Dodd in October, 1924, from eggs of *Moneilema* sp. at Uvalde, Texas; twelve females and nine males from eggs of the same host from the same locality in October, 1922, by E. Mortensen. A female and two males of the last series are slide-mounted.

NOTES ON THE GENUS *OBRIMA* WALKER IN THE U. S.
(LEPIDOPTERA: PHALAENIDAE; EREBINAE).

BY WM. BARNES AND F. H. BENJAMIN, *Decatur, Illinois*.

OBRIMA Walker.

Type.—*Obrima pyraloides* Walker.

Obrima Walker, Cat. Lep. Het. Brit. Mus., Vol. 9, 1856, p. 135. (*pyraloides* sole species and therefore type.)

Obrima rinconada pimaensis Barnes & Benjamin.

Obrima pimaensis Barnes and Benjamin, Proc. Ent. Soc. Wash., Vol. 27, 1925, p. 126.

Obrima rinconada Schaus (Trans. Amer. Ent. Soc., Vol. 21, 1894, 240) was described from Rinconada, Mexico.

Since describing *pimaensis* from six males received from O. C. Poling, Baboquivari Mts., Pima Co., Arizona, we discovered in a box of unsorted material a single male labeled So. Arizona, much darker and with pronounced black irrorations on the primaries.

Remembering that a specimen of *rinconada* which Dr. Schaus had loaned to us was very similar, we submitted to him the Southern Arizona specimen. He informs us that it is quite typical.

At the time we described *pimaensis* we pointed out that it would probably ultimately sink to a subspecies of *rinconada*, but as *rinconada* was only known from the dark irrorated specimens from the neotropics, we did not wish to add the name to our lists.

We see no reason to doubt the locality label on the single specimen of typical *rinconada* before us, nor can we see any real specific differences between it and the types of *pimaensis*, although the superficial differences pointed out in the original description of *pimaensis* are as great as those usually assigned specific rank in the Erebinæ. However, as long as typical *rinconada* has been found in Arizona, we prefer to consider *pimaensis* a subspecies rather than a species.

EDITORIAL.

Perhaps never before has the world been so articulate as it is to-day, certainly never so voluble; yet conversation languishes. We lecture with comparative ease. We talk with difficulty. And our talk is mostly small talk; except when we are talking *en clique*, and then it is "shop." Men of science more than most others—excepting always insurance agents, commercial drummers and possibly actors—are given to this form of clan chatter; chiefly it must be admitted because their work is their greatest pleasure and most absorbing interest (rather wholesome symptoms in a sick age which is only too eager for any distraction from work or other reality); but partly also because they lack something of that broader culture proper to well rounded scholarly men, a sympathetic and intelligent familiarity with philosophy, art, history and the humanities, and a general and really fundamental knowledge of the sciences aside from their own particular specialties. It is rather significant that the greatest general interest in and widest discussion of science is among the magazine-enlightened cognoscenti and that the chief spokesman of the scientific spirit is a novelist infected with theories of pseudo-scientific origin. In the high day of the nineteenth century our spokesman was Huxley—a scientist graduated into a philosopher. His confreres were men of broad culture, touched by the humanities and schooled in a discipline that had not forgotten history nor learned to despise logic. We have fallen somewhat from their level. To-day the true scientists are specialists. Perhaps it is necessary that they should be. So vast is the field, so enormous the accumulation of knowledge, one must specialize to accomplish anything worth while; but he need not be a mere specialist. Ours is a scientific age (a trite saying but true as it is trite) and science touches our lives at so many points that her servants need a very broad and human culture. Who would direct the living must have a philosophy of life; and who would pursue the search for truth must not be content merely with the grubbing of facts.

—*Carl Heinrich.*

NOTES AND NEWS ITEMS.

The Termites of Kartabo, Bartica District, British Guiana, A. E. Emerson, 1925, Zoologica, Vol. VI, No. 4, pp. 291-459, 94 figs.—This excellent taxonomic paper by Dr. Emerson of the University of Pittsburgh is one of the first comprehensive publications on American termites by an American authority. Emerson's work at the Tropical Research Station of the N. Y. Zoological Society at Kartabo, British Guiana, was primarily of an ecological and biological nature but the need for a systematic study of the termites was soon found to be imperative. The field studies were made in 1919, 1920 and 1924.

The Bartica District includes a region within a radius of six miles of Kartabo. 76 species of termites were found in this district, 51 of which were new; 3 striking new subgenera were also discovered. In addition, hitherto unknown castes of known species were found. Very little was previously known of the termites of British Guiana.

The descriptions are careful, precise, but ample. Excellent figures by the author, as well as a key to the termites of the region, accompany the descriptions.

From such an intensive regional study, Dr. Emerson was able to show faunal relationships with other sections of America.

The results of biological and ecological studies of these termites will appear in a subsequent paper and these thorough investigations should stimulate interest in this fascinating group of the social insects.

—*Thomas E. Snyder.*

PROCEEDINGS
OF THE
ENTOMOLOGICAL SOCIETY
OF WASHINGTON



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WALTER DAVID HUNTER.

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In Memoriam

The following resolution presented by a committee composed of L. O. Howard, C. L. Marlatt, F. C. Bishopp and August Busck, was adopted by the Entomological Society of Washington at its regular meeting on November 5, 1925:

The announcement of the death of Dr. Walter David Hunter has caused the members of the Entomological Society of Washington to sorrow very deeply. Although seldom present at our meetings of late years, Doctor Hunter was the dear friend of many of us, and all of us respected him and admired him for his notable achievements in applied entomology. We realize that by his work and his sound judgment and by his high character as a man, he had gained the confidence of the people, especially of the South, to an unparalleled degree. We realize further that he has had a most important influence in the awakening of a realization of the very great value of entomological work. No memorial could express adequately the value of his life work, and we can only grieve with others that blind fate should have stopped it in mid career.

The Society authorizes the preparation of a biographical account of Doctor Hunter and its publication together with his bibliography in the Proceedings of the Society.

WALTER DAVID HUNTER, LL. D.

BY L. O. HOWARD.

Dr. W. D. Hunter, President of the Entomological Society of Washington for the year 1915, was born at Lincoln, Nebraska, December 14, 1875, and died suddenly at El Paso, Texas, October 14, 1925. His father's family were of that sound Scotch stock that moved to the north of Ireland on account of religious persecution. His father's parents came to America about 1825, settling first at Perry, New York, afterwards moving to Rockford, Illinois, and the family moved later to Lincoln, Nebraska. His mother's people were of Scotch-English origin, and came to America about 1635. One of his grandmothers was a descendant of Robert Cushman, who came over on the Mayflower.

Hunter's father, who was a lawyer and ranked high in his profession, died, a young man, in April, 1880, when our former President was four years old. He entered the preparatory school of the University of Nebraska at the age of fourteen, and graduated from the University with the degree of A. B. in 1895, before his twentieth birthday.

There were four children in the family (Walter being the second), and all seem to have been born naturalists. Their mother (who is still living in Lincoln) writes me that Hunter's field work was begun long before he entered the University. She states: "There was not a fence corner within eight miles that the children did not know what birds, plants and insects could be found there. Eight miles was about the limit of our old white horse. Later on they extended their knowledge on foot many miles more."

In the University, he soon began work under Prof. Lawrence Bruner, first on ornithology and taxidermy, but he was soon led by this teacher's enthusiasm into a close study of insects. He seems to have been the most capable and promising of Bruner's students, since he stayed with him after graduation and became an instructor, continuing his work all the time and receiving the degree of Master of Arts in 1897.

His first paper was published during his first post-graduate year (1896) and was entitled "A Contribution to the Knowledge of North American Syrphidae." It constituted the leading article in the *Canadian Entomologist* for April of that year. It included careful description of four new species, with lengthy notes upon a number of other forms. There was nothing amateurish about the article, and it showed a grasp of the subject and a knowledge of the literature worthy of a much older and more experienced worker. This was followed by three other papers—two in the *Canadian Entomologist* and one in

Entomological News—all dealing with the Syrphidae. The final one, published in June, 1897, covers 22 pages and is again the leading article in the *Canadian Entomologist*. Apparently Doctor Bethune, who was at that time the editor of that journal, believed that he had found a new writer of importance.

Recently Doctor Hunter is reported to have spoken slightly of this early work, but it was nevertheless of an excellent character. The habits of close and careful study and of a full search of the literature, which he acquired in this early work, stayed by him in later years and characterized all of his economic investigations. He was distinctly a research man all his life, although, as will appear, he broadened out into an administrator and a man of large affairs.

His work as an instructor and as Bruner's righthand man led him quickly into applied entomology. For several years the entomological service of the federal Department of Agriculture had been employing Professor Bruner to make trips each summer throughout the far west to study grasshopper conditions in order to get early knowledge of the possibility of the development of swarms of *Melanoplus spretus* which might fly out and devastate the western crops as they had done at widely separated intervals for many years. The South American migratory locust (*Schistocerca paranense*) had been doing enormous damage in certain South American countries, notably Argentina, and the Merchants' Locust Investigation Commission of Buenos Aires, through the Argentine diplomatic representatives at Washington, applied to the Department of Agriculture for an American expert to go to Argentina to make the necessary studies and to advise them as to procedures. Bruner was chosen, and left Lincoln early in 1897, leaving Hunter in charge of the Nebraska work. Therefore, in the summer of that year Hunter was commissioned to make the reconnaissance grasshopper trip through the western States. He did this work so well that he was recommissioned in the summer of 1898 to make an especial investigation to determine whether *Melanoplus spretus* breeds permanently in the Turtle Mountains in North Dakota. Professor Bruner returned from Argentina in 1898, and resumed charge of his department at Lincoln, Hunter continuing to act as his assistant.

In 1900 the Supreme Court of Nebraska rendered a decision by which the State University was deprived of certain incomes, and the regents economized by cutting out as many assistants as possible and by reducing expenses in every way. All of Professor Bruner's assistance was cut off, and Hunter was left on the 1st of July without a position. It happened that just at this time Prof. H. E. Summers, Entomologist of the Iowa State College of Agriculture at Ames, needed an assistant, but could pay only four hundred dollars a year. Hunter could have

gone into teaching with four times this salary, or he could have listened to the urgings of relatives and gone into commercial work at a good salary, and his mother wanted him to be a lawyer as his father had been (in fact he studied law for a short time in the office of his father's partner), but, as he wrote at the time, he had seen so many men leave science, temporarily as they thought, to make a little money, who were never able to get back to scientific work, that he decided to accept the sacrifice and stay in the work he loved even at a rate of compensation which, while it might buy him bread and butter, would do little more.

In the meantime the cotton boll-weevil problem in south Texas was becoming very serious. Investigations had been made by the federal service in 1895 and 1896 without especial appropriations. In 1897 the State of Texas made a specific appropriation and appointed Mr. F. W. Mally in charge. The boll weevil, however, continued to spread, and in the winter of 1900-1901 it became obvious that the federal government would be called upon to assist and that Congress would appropriate for this purpose. Therefore it was necessary to find a competent entomologist to place in the field. Hunter, on account of the excellent record he had made in his summer investigations of 1897 and 1898, was chosen and came to Washington early in March, 1901. He had received rather definite assurances of his appointment in January and had spent two months in an intensive study of cotton culture and the cotton insect problem. He was sent at once to Texas, and during the next few months traveled extensively over the State, especially in the regions invaded by the weevil, and accumulated a mass of information, not only about the weevil itself but about cotton in general, Texas conditions and the people of the State. He surrounded himself with the Texas atmosphere and imbibed it until, with extraordinary adaptability, in the course of a few months he had become a Texan and a cotton expert.

After thorough investigation lasting many months, he established headquarters at Victoria, Texas. Urgent efforts were made by interested persons to have him choose Wharton, a larger city to the east. He defended his judgment and was backed by the Chief of the Bureau and by the Secretary of Agriculture in spite of the fact that pressure was brought to bear even upon the President of the United States to secure the change.

At Victoria he began slowly to add to his force until, with the progress of the weevil to the north and to the east it became advisable to change headquarters to Dallas. This latter move was made in 1905, after the weevil had crossed into the State of Louisiana.

While at Victoria Dr. Hunter married Mary P. Smith,

daughter of Dr. E. H. Smith of that city. Mrs. Hunter is still living.

Among the young entomologists who have since become very well known and who were associated with Doctor Hunter at the time of his move were Dr. W. E. Hinds, Dr. A. W. Morrill, Mr. J. C. Crawford, Dr. W. A. Hooker, Mr. W. W. Yothers, Mr. A. C. Morgan, Dr. W. D. Pierce and Mr. C. E. Sanborn. To this list during the following year were added Mr. F. C. Bishopp, Mr. F. C. Pratt, Hon. J. D. Mitchell and Mr. R. A. Cushman. Mr. Wilmon Newell, at that time holding an official position under the State of Louisiana, was engaged as a paid collaborator. Later C. E. Hood, E. S. Tucker, T. E. Holloway, G. T. Smith, G. N. Wolcott and B. R. Coad (to mention only those who have become especially well known) became associated with the work.

In 1909 a laboratory was started at Tallulah, Louisiana, which has since become the main laboratory of the cotton boll weevil investigation, the Dallas station being abandoned for this purpose.

During all this time the most intensive work was going on. Every phase of the biology of the weevil was studied; its ecology (although they did not call it by that name) was investigated carefully in several of its phases, and an enormous amount of experimentation with different remedies and machines was done. It was early found out that planting early-maturing varieties, hastening boll production, and fall destruction of the plants together formed the most practical plan that the cotton planters could adopt. To prove this, large areas of cotton land were secured and broad-scale experiments were carried out which should have proved the feasibility of the plan to the most prejudiced. Publicity was given to this experimental work, but planters were so bound to their traditional methods that little headway was made in bringing about its adoption. Had the early recommendations of Hunter and his force been generally adopted in Texas (and in Louisiana as well), the spread of the boll weevil would have been very greatly retarded and an enormous monetary loss would have been saved.

Realizing that every effort should be devoted to the boll weevil alone, Hunter was instructed to discourage general collecting by his force, but, as he once said, "What are you to do? With a lot of enthusiastic entomologists coming suddenly into a region with a fauna and flora absolutely novel to them, you can't keep them from collecting." He was perfectly right. For several years all of these men were northerners. They had never seen many of the insects that were flying about them, that came to their lamps at night, that crawled over their working tables, that even got into their food at dinner. To them it was like picking up rare jewels. They could not help collecting them.

And as the force grew there was a definite collection, and it grew and grew—one can hardly say without effort, for there was an effort, but it was the other way. Eventually when F. C. Pratt joined the force his great skill as a collector and mounter of insects was brought into play, and later a whole room full of Schmitt boxes of Texas insects was sent to the National Museum in Washington. It seemed to be one of the largest and most varied State collections in existence.

This is hardly the place to enter at all fully into the details of the successes or non-successes of the cotton boll weevil investigation. It has been a very wonderful work. The spread of the boll weevil over the cotton belt of the United States was a dramatic happening which would have been pure tragedy had it not been for the work of Hunter and his assistants. That the problem has now been so nearly solved that the Cotton Pest Committee of the Association of Southern Agricultural Workers has just disbanded, is due largely to the initiative of Hunter and the impetus which his keen interest, his unflagging labor and his wise direction gave it from the beginning.

As soon as Hunter's great ability became plain, other burdens were put upon his shoulders. His work was expanded, at first to include the insects affecting southern field crops in addition to cotton, and investigations were begun on the insects affecting rice and tobacco and sugar cane. A little later he became greatly interested in medical entomology, at first with the carriage of Texas fever by ticks, a little later the study of the Rocky Mountain spotted fever carried by other ticks, still later questions relating to the house fly and to the disease-carrying mosquitoes. This interest and his studies led him to prepare, as retiring President of the Association of Economic Entomologists, an admirable address entitled "American Interest in Medical Entomology." Still later, he used an allied subject, "Some Observations on Medical Entomology," as the subject of his retiring address as President of the Entomological Society of Washington. Nothing better than these two addresses has been published on this general subject. They showed a breadth of reading and an insight into future possibilities that seemed marvelous to his hearers at the time and to those who read the addresses to-day. A great deal has been written on medical entomology during this first quarter of the twentieth century, but I know of no one comprehensive paper that shows a broader grasp of the subject, a sounder outline for future study, or a surer prophetic touch than the 1915 address before this Society.

A probably complete bibliography of Doctor Hunter's writings which has been drawn up by Miss Mabel Colcord, the Librarian of the Bureau of Entomology, follows this article. Looking through the titles, it is obvious that he displayed a

good life's work in print. Some of the papers are of very great value. All of them are sound. No list of a man's writings, however, shows more than one side of his accomplishments. His influence as an individual is a thing apart from his writings; and to those of us who knew him it comes more and more since his death that he was in many ways a very remarkable man.

The final years of his life were largely devoted to the vitally important problem of how to prevent the pink boll worm from establishing itself in a disastrous way in the cotton fields of the South. As a member of the Federal Horticultural Board whose function it is to take care of these questions of quarantine, he assumed a sub-permanent residence in Texas and had charge of the active prosecution of the campaign against this dreaded pest. He found himself in a position which demanded all of his technical knowledge, all of his tact, all of his firmness and honesty of purpose, and all of the substratum of strong friendships and public respect which he had gained during his quarter of a century in Texas. To those who have even a slight knowledge of the conditions and of the opposition which he met from many sources, his success has been most noteworthy.

While engaged in this work Hunter had associated with him Mr. F. S. Puckett, who is at the present moment acting in charge of the pink boll-worm field service of the Federal Horticultural Board. In a recent letter Mr. Puckett has expressed his judgment of Doctor Hunter in a very clear and forceful way, and, coming from a man who had been his intimate associate for a number of years, three of Mr. Puckett's paragraphs may well be quoted:

"Doctor Hunter's methods and plans of operation in quarantine work were always logical, free from unreasonably drastic or strictly experimental courses, constantly keeping in mind the least possible disturbance of normal business relations commensurate with safety. He was farsighted, open to conviction, invited counsel and firm in his conclusions.

"A recognized student with a remarkable memory, always in possession of all available information concerning any subject under discussion, he was a leader in any assembly that he attended and by force of character and of ability to constantly see the main issue, unclouded by details, impressed others with his views and conclusions.

"With his associates he was genial, approachable, interested in them and their affairs and a teacher, yet so fully impressed them with his earnestness, high order of courage and resourcefulness that there was inculcated in their minds a determination to succeed in their assignments. Never discouraged but calm and collected at all times and under the most extreme conditions, resourceful with absolute power of concentration and a great organizer, he could invariably discern all the forces available to attain a desired result; his quick reading of men and instant grasp of the subject enabled him to employ means and persons both in and out of the Department to attain such ends

as would never have occurred to men not possessing all the qualities of leadership found in him."

Although Hunter's mind was peculiarly fitted to research work and although he had done much excellent work of that character, it is to be doubted that, had he lived, he would ever have returned to personal research, although he often said that he would like to do so. Undoubtedly, however, his great ability in directing and stimulating research would have had full play and the world would have been a great gainer.

It remains only to emphasize Hunter's endowment of qualities that make for warm friendships, not only qualities that bound men to him, but a warmth of heart and a discernment of the finer things in other men that made him more than merely appreciative of them. He was not a demonstrative man; on the contrary, he impressed one as judicial, self-repressed. But as you felt yourself growing closer to him, you were sure of a reciprocal feeling and his life was full of warm friendships of an unexpressed depth. A man is fortunate to have even one friend as true as any one of very many of Hunter's.

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POLICIES RELATING TO TYPE SPECIMENS OF INSECTS.

BY W. L. McATEE.

The institutional view as to policies relative to insect types has been presented,¹ and it would seem only fair to give the individual point of view an inning. Although the writer now works both in cooperation with, and as a member of, institutions maintaining collections of insects, he feels qualified to present the case for the isolated individual worker, if for no other reason than that he is constitutionally an individualist.

The accumulation and due care of types are proper branches of museum business and no objection can be legitimately raised to proper efforts along these lines. Here, as in most lines of endeavor, however, we should beware of setting up a golden calf and worshipping it. Accumulation of types can scarcely be accomplished with dignity, and certainly not to the advantage of science, by the publication of brief or hastily-prepared descriptions of new forms without keys or comparative notes.² Again, accumulation of types by recognition of certain institu-

¹Rehn, J. A. G. Depositories of type material, Ent. News, 32, No. 6, June, 1921, pp. 180-182.

Davis, John J. On the deposition of type material, Ent. News, 32, No. 10, Dec., 1921, p. 315.

Skinner, Henry. Loan of types. Ent. News, 35, No. 1, Jan., 1924, p. 22.

²For supporting view of an ornithologist, see Stone, Witmer, The Auk, 33, No. 1, Jan., 1916, pp. 111-112.

tions as preferred type depositories, despite propaganda for it,¹ is not apt to be a thorough-going success as it is opposed to fundamental desires of human beings, that are just as strong in officials and employees of other museums as in those aiming to be the depositories.² Centralization of types is opposed also to the general museum movement; with the increase in population of cities the number of museums grows, and most of them sooner or later become depositories of types in some branch of natural history. There are certainly more than a hundred different collections in the United States that now contain types of insects, and the number is constantly increasing.

The other horn of the type policies dilemma, namely, care of types, also has its unobjectionable as well as objectionable aspects. Distinctive labelling, good museum care, and separate receptacles (if must be) for types, all can be viewed with equanimity, but when care is so extended in meaning that the loan of type specimens is entirely prohibited, doubts as to the merits of the system naturally arise. Admittedly, this prohibition has brought about in some cases, perhaps partly in all, through praiseworthy motives, but it is just as certain that monopolistic tendencies have had to do with the matter, and refusal to loan types is intended in some cases to forcibly reserve investigations of some group for a certain institution or worker therein. Then, too, resentment toward other institutions or individuals have brought the motive of retaliation into such rulings. Any one who has even a little knowledge of the recent history of type movement or lack of movement in this country can supply from his own experience illustrations of each of the motives mentioned.

The modern tendency in scientific work is towards more highly cooperative effort, but here is a barrier—refusal to loan types—that stands squarely opposed to the growth of cooperation. And from what motives?

A few are noted above and we may refer briefly to others. Fragility. Yes; many insect types are rather fragile, but we have excellent methods of packing, and extensive collections have been moved long distances, and more than once, without the loss of a single specimen. Dr. Walther Horn of the

¹One reason advanced for centralizing types is to make them more accessible to workers. This means, of course, to workers at those museums in particular, certainly not to workers in general. Authorities of would-be depositories, if they believe in the accessibility principle, surely should have bad consciences when they describe and retain the types of large numbers of species from other countries.

²See Rep. Director Mus. Zool. Univ. Mich., 1922, p. 32.

Deutsches Entomologisches Museum¹ writes that in thirty years' shipment of specimens to all parts of the world, only two boxes were smashed. Museums, even of the hoarding type, will loan material of groups they can not work up themselves when it is known to contain undescribed species. In a sense these are more valuable than previously described species, as they are known additions to the collections of the museum. If chances can be taken on the transportation of these specimens to a specialist and back again, during half of which travel they are types, why is it necessary to place an embargo upon them immediately thereafter? In some cases institutions have gone so far as to refuse to return such specimens for reexamination and verification of characters before descriptions had been published. To be candid, however, all this is beside the mark, for fragility is not the factor that has decided certain museums to refuse to loan types; they will not loan types of any kind whether they be alcoholic, slide mounts, birds, mammals, or even petrefactions (fossils) some of which certainly are not fragile and can be transported with as much safety as anything that is entrusted to channels of communication.

We are ingenuously informed that types are deposited in museums with the stipulation that they shall not be loaned, but of what proportion of types is this true? I dare say it is an entirely insignificant percentage, and further venture that the donors making such stipulations if they understood the tangle into which lack of cooperation between museums is driving us, would never have made this requirement, or if still alive would revoke it. Balancing, if not overbalancing this argument, is the fact that individuals who, without due precaution, have deposited types in certain museums and have been unable later to borrow them for their own use, have vowed that no more of their material shall go to such institutions if they can prevent it.

Refusal to loan types has also been defended on the ground that it is unnecessary for other students to see them, and a "distinguished" entomologist has been quoted as follows: "If persons are obliged to see my types to identify species,² my descriptive work must be faulty and not worth while." Surely the distinguished entomologist can not complain if we agree with his statement in its entirety—but we will take the sting away from that remark by noting that the necessity of seeing types *to identify species* may apply to the work of any entomologist. Say another worker collects an important lot of new material, finds useful characters not hitherto used in the

¹This institution, like the national museum in Berlin, and in Vienna, and several other really enlightened institutions, loans types.

²On this theory types should be discarded as unnecessary and not preserved.

group (and this may happen in any group); it is evident that descriptions that do not mention these characters are not a satisfactory basis of identification. This does not indicate that the previous work is intrinsically faulty, and not worth while, but merely that new light has been shed on the problem and a reexamination of material made necessary. It may be stated here that the word type as used in this paper in most cases means holotype. For the purposes of a reviser nothing else will serve to surely identify the species. The species is based on a specimen, and any other specimen may be another species. Neither paratypes nor homotypes have real validity for the critical reviser.

Care of type specimens has assumed so exalted a degree of importance that it has been seriously stated that types "should be preserved intact * * * dismembering * * * should not only be discouraged but prohibited." In the case of some groups of insects where the internal genitalia have become the criterion of specific distinction, following the policy quoted would prevent identification of species described before the genitalic method of classification was in use. In other words, while a museum following such a policy might have numerous types in difficult groups of insects they would be of no value and students would be forced to proceed with their work regardless of the sequestered types. If dissected, described, and illustrated, they would be of value to entomologists the world over, held intact in a museum they are of no more value than a fossil buried in the rock awaiting the stroke of the explorer's pick that shall bring it to the knowledge of men.

No one will deny that types of insect species are of very great value to entomological taxonomy. However, it is evident from the preceding portions of this paper that this value has so impressed certain individuals and institutions that it has impaired their sense of relative values even to the extent of making them blind to the great importance of mutual trust and cooperation among scientists, and scientific institutions, and leading them to do things which render trust and cooperation impossible. While insect types are useful and valuable, often indeed necessary, for the identification of species, they are by no means indispensable to the progress of systematic entomology. There is a wide and very significant gap between the desirability or even importance of identifying described species, and the improvement of the classification of insects. The latter can and will continue regardless of the impossibility of identifying various species, no matter how numerous they may be.

The point may be exemplified by a case I will put in hypothetical form though concrete parallels are not unknown. We will say that the island of Utopia, now with a large and well-educated population, has hitherto depended chiefly upon out-

side agencies for its entomological work. Suppose some particular museum has rather got the run of things from Utopia and some specialist in that museum has published many descriptions (say 500 for a round number) of species in his particular group. The specialist being a mere human, may begin to get chesty about his control of the group and entrenched behind his 500 descriptions may boast "Well, any one that wants to study the Utopiidae has to come here; I've got the group so tied up they can't wiggle."

Never was a more mistaken opinion or a more empty boast. At this stage of Utopian progress some young and ambitious entomologist is due to appear. He becomes interested in the Utopiidae, collects a large number of them, makes observations on their habits and carries on some life-history studies for some time, and making a classification of his own, the young entomologist encounters the problem of utilizing previous work. This, according to the prevailing practice, consists merely of descriptions, without system, most of them not even mentioning characters the student of the group as a whole has found most valuable. To identify many of the previously described species, therefore, he must see types. To his surprise and disgust he finds these are not for loan. Then being a mere human being, like the museum specialist, human attributes begin to manifest themselves. He gets his back up, so to speak, and soliloquizes about as follows: "Why should my work, which I know is much more valuable than those descriptions, be blocked just because I'm not rich enough to make the trip to that museum? It's not fair for those foreigners to monopolize the study of any of our insects, and, by George, I'm going ahead with my work just the same."

And now the present writer interjects, "By the eternals, he is absolutely justified." Moreover, because of its usefulness to the entomological world, his monograph presenting a classification of the group will prevail, it will be used and remembered, while the mere descriptions of his museum rival will be unused and forgotten.

Now let us consider another aspect of our hypothetical case. It is obvious that the young Utopian entomologist will have a lot of type specimens in his possession, possibly more than the museum itself. Many of his species, no doubt, are synonyms, but under the method of specific types the type specimens of all published names are of equal importance. The type of a supposed synonym may be examined by one specialist, and the synonymy stated, but that may not satisfy the next student of the group, so that type also must be available for examination to settle things by the type system.

Is it not clearly apparent from our hypothetical case that the museum has dug a pit for itself? By attempting to monopolize

study of a group, it has brought about a situation that stops its own work, for without completely stultifying itself, it can not proceed without examination of the Utopian types, a thing that will not be made easy, to say the least.

This method, this defense, against museum domination is available to entomologists anywhere and may result, under present conditions in obstructive conflicts about many groups. Is not the lesson plain that it would be much better to adopt more tolerant and cooperative methods? With a hundred or more depositories of insect types in the United States at present and the number certain to grow, a more liberal policy relative to the loaning of types would seem to be necessary. Exceedingly few entomologists can afford either the time or the money to visit a large number of scattered institutions, yet that is just what they must do if taxonomic papers are to be based on types, and other institutions and individuals adopt the same policies as the non-loaning museums. Journeying to consult types is impracticable also for other reasons. In the writer's opinion, the only time an investigator can examine types with real profit is when he is just concluding a revision of a group. Manifestly he can not visit all the type repositories at each revision, so he will have to leave various species in a doubtful status or wholly unidentified. They will have that status henceforth even in their home museum until worked over by a reviser. How much better to send them out and have knowledge of the group made as complete as possible.

SUMMARY.

There are at least two sides to every question, but it is seldom that all points of view receive equal consideration. Those who must strongly favor the centralization of types in a few museums and in prohibiting loans of types usually are employes of those institutions. This in itself shows that these views are prejudiced and it would be well for these advocates to exercise sincere introspection and ask themselves what their views would be if they were attempting to carry on their work across a continent, or half way around the world from the type depository.

Type specimens, like hoarded money, have only potential value. They have actual and practical value only when in use. Under the type system for the recognition of species the question must be faced as to whether types are more valuable than their species. They must be so regarded by those refusing to loan them, for in many, perhaps most, cases species can not be critically identified without examination of their types. Consequently revisers unable to see types either must omit the species concerned or list them merely as unidentified; in other words, such species are on the road to oblivion.

Systematic studies can not be indefinitely postponed, interfered with, or entirely defeated by hoarding of types. No, the tendency will be to get along as well as may be without them. This means that whenever a group is studied from a point of view different from that of the original describer of a species, whenever new characters are discovered and used, a species, the type of which can not be seen, must be ignored. Inevitably some of them will be redescribed; the new species will have a type, and hoarders of types will be just as much inconvenienced by inability to examine that type as its author was by their original action or rather inaction.

All of this points to the desirability of freer loaning of type material. Loans to Tom, Dick, and Harry, to be sure, are not urged, nor to individuals or museums that have shown themselves non-cooperative or unethical, but any responsible and ethical student of a group who has demonstrated his ability to handle taxonomic work satisfactorily should be able to borrow type material for limited periods, when he is at the point in his studies where he can really make profitable use of it.¹ The present tendency is to build insuperable barriers to type loaning among institutions, and such a movement, if not modified, will create rivalries, jealousies, and resentments that in time will prevent all intercourse in types. Is not loaning, at all hazards, preferable to the engendering of such feelings and to the stagnation this system can not fail to cause in research by workers in these museums, bound as they are by the type fetish?

Private collections as a class are more liberal in loaning material than are museums, and it would seem good policy, therefore, pending the liberalization of institutions in this respect, for taxonomists to see that as many types as possible are placed in private collections, and transmitted from one private collection to another. In a comparatively short time, the number of types in private holding will approximate that in institutions, a condition that will put the private collectors in good position to demand more liberal treatment from the museums.

¹In a museum loaning activities could best be handled by a committee. In this way aspects of each case due to personalities both within and without the museum would receive due consideration and the resulting decision in the form of an impersonal ballot would settle each case without intensifying existing differences.

INTERESTING RECORDS OF TWO LITTLE KNOWN PARASITIC HYMENOPTERA.BY A. B. GAHAN, *U. S. Bureau of Entomology.*

The writer recently received a consignment of material for determination from Guy A. K. Marshall, director of the Imperial Bureau of Entomology, London, England. In the lot were specimens of two species the records for which are very interesting.

***Paracarotomus cephalotes* Ashmead.**

Four male specimens of a parasite reared from puparia of a Syrphid fly, *Paragus* sp., at Ibadan, South Nigeria, by O. B. Lean were especially interesting. Having failed to find anything recorded from the Ethiopian region which agreed with these either specifically or generically, I turned to the North American collection in the desperate hope of finding at least a generic name for them. To my very great surprise they proved to belong to the genus *Paracarotomus* Ashmead and not only were they congeneric with the genotype species, *P. cephalotes* Ashmead, but they were identical in every respect with that species. This genus and species were described (Trans. Amer. Ent. Soc., vol. 21, 1894, p. 335) from a single female specimen taken by A. D. Hopkins at Morgantown, West Virginia, in a sweeping net. In addition to the type the national collection possesses a single male taken by J. R. Malloch at Glen Echo, Maryland, June 18, 1922. Nothing has hitherto been known as to the habits of the species, which is the sole known representative of the genus.

The occurrence of this apparently rare species in two such widely separated and faunistically different regions as North American and Africa at first seemed difficult to believe, but when inquiry of the dipterists developed the fact that at least two species of *Paragus* are common to North America, Europe, and Africa, it did not appear quite so incredible. If the host is capable of such a wide distribution, there appears no good reason why the parasite should not follow it. Perhaps the most remarkable thing after all is that the parasite has not been turned up elsewhere.

***Telenomus nawaii* Ashmead.**

This species was described (Jour. N. Y. Ent., vol. 12, 1904, p. 72) from specimens reared from eggs of an unknown lepidopteron at Gifu, Japan. In the material received from the Imperial Bureau of Entomology, were several specimens which appear to be identical with the types and which were reared from the eggs of *Prodenia litura*, at Levuka, Fiji, by H. W. Simmonds.

**NOTES ON THE NESTING HABITS OF BEMBIX COMATA
PARKER.**

BY J. B. PARKER, *Catholic University, Washington, D. C.*

These observations on the habits and nesting activities of *Bembix comata* Prkr. were made on the sand dunes of San Francisco within the month of July, 1925. These sand dunes lie adjacent to the ocean shore line and are continually swept by the chilly winds coming in from the Pacific. Although these winds during July are less violent than at other seasons of the year, yet at times they blow with sufficient force to move the loose sand and to cover in a very short time any impressions made in it. The nesting site, where I pursued my investigations, is situated on the sloping side of a depression, the slope facing the ocean but protected somewhat from the force of the winds by a high dune lying between it and the shore line, which was distant from it a half mile or more. Lying as it does, practically all the loose sand had been swept off the nesting site leaving the surface relatively firm and smooth, and it was because of this condition of the sand, no doubt, that the wasps nested here in such large numbers. When the sand at the surface is loose it is next to impossible for these wasps to construct their nests, since any excavation a wasp may make is filled up by the loose wind-driven sand as fast as the wasp can dig it out. Wherever I stepped in walking about over this area I broke the surface and loosened the sand, and whenever this occurred over the entrance to a burrow, if the wind was at that time blowing at all violently, the wasp had no end of trouble in gaining entrance to her nest.

The nest consists of a tunnel or burrow, variable in length but generally from eight to ten inches in extent, which terminates in an enlarged brood chamber, usually about four inches below the surface of the sand. In this brood chamber a single young is reared and until this young wasp has completed its larval stage, that is, its period of feeding, the burrow remains a simple tunnel straight or tortuous as the case may be. But as soon as this larva is full-grown the wasp fills up that part of the tunnel immediately in front of the brood chamber and at a short distance from it toward the entrance proceeds to construct a lateral tunnel which also terminates in a brood chamber. In constructing this lateral, the wasp digs forward and either to right or left, forming almost a complete semi-circle, so that the brood chamber lies almost opposite the point where the lateral diverged from the main tunnel and, in fact, in some cases it was further back toward the entrance to the nest than the point of divergence from the main tunnel. When a larva has been reared to full growth in this lateral a second

lateral of similar pattern is constructed off the main tunnel opposite the first one. How other brood chambers, if any, are provided in the same nest I did not learn, since no nest opened contained more than three brood chambers, and of these, two invariably contained encased young and the third an egg or a free, feeding larva in some stage of development.

In constructing its nest this species differs from *B. spinolae* Lep., a closely related species whose nesting habits I have studied here in the District, in that the latter does not construct lateral tunnels in order to provide additional brood chambers. In my observations on *spinolae* I failed to find a single case where two brood chambers were constructed from a single tunnel. When *spinolae* needs a new brood chamber she constructs a new nest. The two species agree in always closing the nest when leaving it and closing it from within on entering. They also agree in having the tunnel, at a point about midway of its length, closed by a quantity of sand which divides the open part of the tunnel into an anterior and posterior part and through which the wasp must dig every time she enters or leaves the brood chamber.

Like *spinolae*, *comata* spends the nights within the nest and also such portions of the day as are not suited to her outdoor activities. She may usually be found in the anterior portion of the tunnel, but I have sometimes found her in the brood chamber. In such cases I suspect that the wasp, alarmed by my digging into the nest had fled to the brood chamber in her efforts to escape.

The utter lack of any instinct on the part of the female *Bembix* to defend her nest and young against intruders was shown repeatedly in my opening of the nests of this species. When a nest is opened with the wasp in the anterior part of the tunnel she will dash out and fly away if given the slightest opportunity. If she is prevented from escaping in this way she will turn about and dig through into the brood chamber, and when this part of the tunnel is opened she will again try to escape if she can. If prevented and forced to retreat into the brood chamber, when she finds herself thus cornered, she will begin a frantic digging in which she will kick out of the brood chamber its entire contents including her helpless offspring in her mad efforts to escape. She knows well enough how to use her sting in procuring food for her young, but seems wholly ignorant of how to use it in defending this same offspring when it is threatened with destruction.

The males also dig burrows in which they spend the nights and presumably such portion of the day as are not suited to their roving activities. In watching the females storing their nests with food I frequently observed that when the female entered the nest with her prey a second wasp would immediately

pop out and make off with all haste to be followed out of the nest by the female, which would buzz about for a short time and then reenter the nest. I suspect that these intruders were males that by mistake had taken up their quarters where they were not wanted. At any rate in a number of instances of this kind I caught the remaining wasp as she left the nest and in each case the wasp proved to be a female.

B. comata, like all species of the genus *Bembix* thus far studied, preys upon various species of flies which she paralyzes with her sting and brings to her nest as food for her young. When she has digged her nest and completed a brood chamber she sets forth at once to obtain a fly on which to place her egg. On July 22, on Lone Mountain, a conspicuous landmark in the city of San Francisco, I watched a female begin and complete the construction of her nest. She began digging at 3:25 p. m. and at 4:20 the nest was finished and the wasp flew away in search of a fly. It thus required 55 minutes for this wasp to construct her nest in sand that was much firmer and harder to dig in than that found on the dunes. She returned with a fly at 4:25 and entered the nest. By this time fog was coming in from the ocean and the temperature had dropped to a point where I found myself decidedly uncomfortable though wearing a sweater. Long before the nest was finished all the other wasps, of which dozens had been buzzing about earlier in the afternoon, had disappeared from the scene. Consequently when the wasp entered the nest with her prey she remained within the nest. I waited till 4:45 and then opened the nest. The tunnel, which was almost straight in its course, was nine inches long and the brood chamber was three and one-half inches below the surface. I found the wasp in the anterior portion of the tunnel and in the brood chamber I found the fly with the newly-laid egg resting upon it in the usual fashion. This first fly, which is always used to support the egg, is placed upon its back on the floor of the brood chamber and is firmly fixed in the sand. The long white egg is placed upright on the fly with the base attached to the right side of the thorax and resting in part on the right wing which is extended almost at right angles to the body. All the eggs discovered were attached in this same fashion. This fly which supports the egg is not eaten by the larva, which remains attached to it after hatching and which thus uses the fly as a support from which it reaches out to feed on other flies brought in by the mother wasp after the larva has emerged from the egg. I repeatedly found instances in which a half-grown larva was still attached by its posterior end to the fly that evidently was used only to support the egg since it was still intact and covered up by the remains of other flies that had served as food.

On the afternoon of July 16, while watching the wasps that were busy among the flowers on some plants near the nesting site among the sand dunes, I saw a female seize a large fly (*Eristalis tenax* L.) on a flower and tumble with it to the sand, where, after a fierce struggle the pair came to rest with the wasp uppermost. The rapidity and violence of the respiratory movements of the wasp showed that the struggle had taxed her energy severely. Before I could get near enough to the pair to use my net, the wasp rose with her victim, flew away a short distance and alighted or rather tumbled down on the sand, where the two struggled and rolled about for some time before the wasp succeeded in righting herself with the fly beneath her. Again I approached and again the wasp flew away with her prey with me in pursuit. Fortunately the wasp directed her flight against the wind which together with the weight of the fly so impeded her that I caught her after a short chase. When taken in the net the wasp released the fly, which to my surprise had not been harmed in the least. It has generally been accepted as a fact that these wasps paralyze their prey by stinging it immediately after seizing it, but in this case, although the wasp had had ample time and opportunity to sting the fly, she had failed to do so.

On July 19, the wind swept over the nesting site with more than usual force and the wasps, active in spite of the strong wind, were having more than their share of trouble in entering their nests with flies. As is well known these wasps carry their prey ventral side up firmly clasped beneath them by use of their middle pair of legs. They do not lay aside their prey while opening the nest but retain it in this position and so carry it into the nest. While opening the burrow they stand on the hind legs and dig with the first pair, the second pair being used to hold the prey. Consequently, on this day when the wind was strong and intermittent, whenever a wasp alighted and began to dig open her nest, a strong puff of wind would strike her and send her with her prey rolling over and over on the sand sometimes to a distance of ten or fifteen feet before she could rise and fly back to her nest. All this was very amusing to the observer, but the wasps did not appear to get much enjoyment out of the proceedings. One wasp came in with an unusually large fly and time and again when she tried to enter her nest the wind caught her and sent her with her fly rolling over the sand. It was fully ten minutes from the time she arrived with her victim until she succeeded in entering her nest. When she did succeed in opening the nest the entrance proved too small to permit her to carry in her prey in the usual way, consequently when she entered carrying the fly she had to release her hold and so left the fly with its legs sticking up in the air and its head tightly wedged in the entrance to the nest. I reached over

with a pair of forceps, seized the fly by one leg and pulled it out. It promptly twisted off the leg and flew away. It was unharmed.

Soon after this another wasp arrived with a large fly and after having almost as much difficulty as the first, finally succeeded in opening her nest. When she entered with her prey she had to release her hold upon it and leave it with its head wedged in the entrance to the nest. Before I reached the fly it set up a vigorous kicking, got loose and flew away. The wasp came out, hunted all about for her prey and then reentered the nest. While she was inside at this time I placed at the entrance a half-eaten large fly that I had taken from another nest and when the wasp came to the entrance she seized this wreck of a fly and dragged it into her nest, from which she presently emerged and flew away in the usual fashion.

Later on in the day a third wasp came to her nest with a large fly and after the usual struggle with the wind succeeded in opening her nest. Like the other two she was obliged to leave her victim wedged head-first in the entrance when she attempted to carry it into the nest. This fly quickly got loose and escaped. The wasp came out, hunted all about and not finding the fly reentered the nest from which she emerged shortly and set off in search of another fly. At the end of twenty minutes she was back with a second fly that I believe to be of the same species as the first. On this occasion I crept quite close to the nest and when the wind rolled the wasp and her victim about on the sand I could plainly see that this fly too had been brought to the nest unharmed. In the struggle that followed, each upset by the wind, the wasp was hard put to it to regain her feet and still maintain her hold upon her prey. As far as I was able to judge from her actions in these struggles, the wasp made strenuous and repeated efforts to sting her victim but it seemed that the necessity of holding the fly tightly against her in order to hold it at all, made it impossible for her to flex the abdomen sufficiently to enable her to use her sting. She finally succeeded in entering the nest leaving this fly wedged in the entrance as she had left the first. Realizing that this one also would escape before the wasp would return to the entrance, I threw the net over it flat just as it got loose and thus held the fly at the entrance under the net. The wasp came out and seized the fly, which had crept a short distance away from the entrance, and started to drag it back into the nest. As the wasp began backing up dragging the fly after her, she became entangled in a fold of the net, released her hold and attempted to escape. Both fly and wasp were taken and are placed on the same pin. The fly, which was identified by Mr. Greene, is *Erstalis arbustorum* L.

Now, the question arises: why did not these wasps paralyze these large flies before bringing them to the nest? Flies as large as these, perhaps specimens of the same species, were found in the nests of other wasps. Were these thus found paralyzed before taken into the nest or afterwards? In two cases where the flies were so large that they had to be left sticking in the entrance when the wasp attempted to carry them into the nest, they were removed by me and found to be paralyzed. Do the individuals of this species of wasp differ in their ability to inflict a sting on a large fly or do some of them make a practice of bringing in their victims alive and then paralyze them after they get them inside the nest? Unfortunately, I failed to find a case in which an uninjured fly was left sticking in the entrance and was afterwards seized and dragged into the nest, nor have I any evidence to show that smaller flies are ever taken into the nest in the usual way before being paralyzed. That some of these wasps do attempt to bring into their nest flies that have not been paralyzed is evident but we shall have to await further investigations before we can explain this departure from what has been regarded as the orthodox course for a *Bembix* wasp to pursue in such cases.

Wasps of this species will work under weather conditions that would completely discourage the other species of this genus, *spinolae* and *nubilipennis*, that I have had an opportunity to study. This is, no doubt, due to the fact that *comata* has become adapted to conditions that prevail on the sand dunes. The wind blowing over the dunes is always cold so that early and late in the day the wasps are not active at all, and if the sky is heavily overcast with clouds they remain inactive all day long. I made several trips to this nesting site arriving about 1:30 P. M., only to find the sky heavily overcast and not a wasp on the wing. The energy, however, that is displayed by these wasps in bringing food to their young is shown by the following data obtained on a day when the clouds were high and thin and the sun occasionally broke through. I kept four nests under observation at the same time for a period of almost two hours. Wasp of No. I arrived at her nest with prey as follows: 11:32, 11:44, 11:52, 11:59, 12:22, and 12:27; No. II, 11:44, 12:38, 12:57, and 1:11; No. III, 11:56, 12:04, 12:27, 12:47, 12:55, and 1:11; No. IV, 12:28, 1:05, 1:12, 1:19, and 1:23. From this it will be seen that No. I brought into her nest six flies in a period of 55 minutes; No. II, four flies in an hour and 27 minutes; No. III, six flies in an hour and 15 minutes; and No. IV, five flies in 55 minutes. The time spent by the wasps within the nest on these visits varied from one-half to one and one-half minute, the usual time being about one minute. The rapidity with which a wasp brings in prey when the day is favorable depends largely upon the age of the

larva she is feeding. If the larva is approaching full growth and the flies furnished are small the larva can devour them almost as fast as the mother wasp can bring them in and this is particularly true if the weather for a day or two preceding has been such that the mother was forced to remain idle.

Unhappily I had not the facilities nor the time to attempt to rear the larva of this species from egg to encasement and consequently I have no data showing how long the feeding period lasts or what quantity of food the larva consumes. When the larva is full grown it forms a case, or cocoon, about it composed of grains of sand held together by cement furnished from glands in the mouth. An examination of several of these encased forms, derived from eggs deposited this season, showed that some had already transformed to the pupa stage. I brought a few of these encased forms home with me and on September 28 an adult female emerged from one of them in the laboratory. It is my conviction that at least two (perhaps more) broods per year are produced on the sand dunes.

In opening the nest on the different days I saved a number of the flies not yet mutilated by the larval wasps and brought them back with me. These were kindly identified for me by Dr. Aldrich. A list of them with his notes follows. The numeral opposite the name indicates the number of specimens.

LIST OF DIPTERA FROM NESTS OF BEMBIX COMATA.

- Apatolestes hera* O. S. 2 ♀, 2 ♂. Known heretofore only from the two type females, collected on the streets of San Francisco by the actor, Henry Edwards, prior to 1877, when the species was described.
- Thereva niveipennis* Kröber. 8. Apparently known heretofore only from the single type, now in the National Museum from Alameda, Calif.
- Hydrophorus gratiosus* Ald. 1.
- Hydrophorus* sp. 1.
- Toxomerus* sp. 1. Headless.
- Eristalis tenax* L. 1.
- Eristalis latifrons* Lw. 1.
- Hylemyia cilicrura* Rdi. 1.
- Lispa tentaculata* DeG. 15.
- Muscina assimilis* Fall. 2.
- Musca domestica* L. 2.
- Lucilia sericata* Mg. 1.
- Phormia regina* Mg. 1.
- Senotainia trilineata* V. d. W. 1.
- Tachinomyia similis* Will. 1.
- Bonnettia comta* Fall. 1.
- Meigenielloides cinerea* Tns. 1. We had two—the types, from New Mexico and one from Mexico City.
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**A NOTE ON THE DISTRIBUTION AND SYNONYMY OF A MYIASIS-
PRODUCING FLY.**

BY RAYMOND C. SHANNON, *U. S. Bureau of Entomology.*

Lucilia argyricephala Macquart, *Dipteres Exotiques*, Supp. I, p. 326, 1846.

Lucilia pallescens Shannon, *Ins. Ins. Mens.* XII, 1924.

While visiting Prof. Mario Bezzi (Turin, Italy, July, 1925), the writer showed him specimens of *Lucilia pallescens* Snn., described from Wilmington, North Carolina. Bezzi stated they were con-specific with *Lucilia argyricephala* Macqr., a well known species in parts of Asia and Africa which has been reported as an agent of myiasis.

Additional material is at hand from the United States which shows this species to be widespread although occurring much less commonly than *Lucilia sericata*. The writer has very recently collected two males of this species on the windows of the National Museum. Apparently the species is established in the vicinity of Washington.

DISTRIBUTION IN THE UNITED STATES.

Texas: Dallas, reared December 27, 1913 (Screw-worm Breeding 327, E. W. Laake).

Dallas, June 19, October 26, 1914 (Bishopp 3375, 39170).

Galveston, August 9, 1914 (Bishopp 3514).

Kansas: Parsons, October 10, 1914 (Bishopp 3790).

Mississippi: Christian Pass, June 8, 1914 (J. M. Aldrich).

North Carolina: Wilmington, July 1, 1919 (Max Kisliuk).

District of Columbia: Washington, September 27, 1920 (A. N. Caudell), September 3, 1925 (R. C. Shannon).

The writer has also seen specimens of *Lucilia argyricephala* from Hawaii in the British Museum collection. (Recorded in the *Fauna Hawaiiensis*, vol. III, p. 84, as *Lucilia* species, Mts. of Honolulu, 1900.)

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EDITORIAL.

From a casual reading of scientific journals one might get the impression that taxonomy is necessarily a rather dull, prosaic business and that the taxonomist, however he may be inclined to flirt with theory, must remain safely and sacredly wedded to fact. To any one so deluded I recommend a paper by Dr. Roger Verity (M. D.) which has been running for several months in *The Entomologists' Record and Journal of Variation*.¹ With the freedom of an emancipated mind this author soars beyond the commonplace of facts, mounting from assumption to conclusion through the magic circles of hypothesis unto the dizzy empyrean of fiction pure and undefiled whence he views with clairvoyant eye the evolution of species, and reveals to us the meaning and the methods of their evolving. Mystery is unveiled. We are bidden to look upon a war of hormones, a new kind of Guelf and Ghibbeline contest of catabolics and anabolics, begun in preglacial days and continued under the spur of chill and balmy breezes unto the production of what—for lack of a better name—we may call the *Zygaenae* complex. The paper deserves an extended commentary; but our space is limited and I must confine myself to quotation of a single paragraph (p. 118). It is a choice bit, but typical.

“To better define” (*the doctor is a congenital splitter it seems*)—“to better define what I designate as catabolic and anabolic constitutions, I must recall the latest discoveries of Physiology in the Vertebrates. It has been established that both their minutest features of structure and their behavior are due to the proportions between the secretions of their endocrine glands, which are thus the cause of individual and racial differences. In dogs, the catabolic greyhound is a typical example of a thyro-centric (predominance of thyroid-gland), and the anabolic bull-dog of a pituitary-centered. All have been struck by the resemblance of certain men to these types, showing that the same combination of glands can reproduce them in the most different kind of species. In mankind the Caucasian race owes its superiority and adaptability, which have made it predominant, to a particular concentration and balance of hormones in its blood”; (*some might want to credit the predominance to gunpowder. I suspect the doctor is a Nordic*); “the Mongolian is subthyroid; the Negro sub-adrenal. We are thus perfectly justified in assuming” (*a fine bit of post-impressionist logic*) “that similar phenomena take place also in the invertebrates, with the difference, that the latter are much more sensitive to surroundings and in consequence more markedly modified by them.”

And so it goes—an intolerable deal of speculation without one half-pennyworth of fact. Yet withal the flighty doctor does us a service. He settles the vexing question of what is a species. It isn't. At most it is a subspecies, an “exerge” either “catabolic” or “anabolic”—and sometimes a little of both (my grammar reflects the doctor's reasoning). This of course helps; but there's a heavy payment exacted for the service. From the illicit union of assumption and conclusion he litters a mongrel progeny of subspecies, races, varieties, forms and hybrids which he must needs legitimize by nomenclatorial baptism, thus overburdening more an already overburdened synonymy. We can only wish that one who seems so susceptible to modern vagaries would suffer that last infirmity of scientific minds—eugenics—and practice a little birth control.

—Carl Heinrich.

¹“Remarks on the evolution of the *Zygaenae* and an attempt to analyse and classify the variations of *Z. lonicerae* Scheven, and of *Z. trifolii* Esp., and other subspecies,” 1925, pp. 101–104, 118–121, 135–138, 154–158, etc.

NOTES AND NEWS ITEMS.

The Dognin Collection: The Museum has been most fortunate in securing the Dognin Collection of Heterocera with its numerous types, making our Neotropical collection by far the best and most complete of any museum either public or private. For many years Mr. Dognin has had collectors in the field, besides correspondents who have sent him large local collections, chiefly from localities heretofore poorly represented in Washington. Mr. Dognin, a friend of many years' standing, had always promised me the first chance to secure the collection if offered for sale; this he did last year, so with the sanction of Dr. Walcott, Secretary of the Smithsonian Institution, and Dr. Howard, Chief of the Bureau of Entomology, I sent out a large number of letters urging people of wealth to subscribe to the fund of \$50,000 required, not only on account of the economic value of the collection, but also out of patriotism, as it would have been an irreparable loss to American students and workers if the collection had remained in Europe. With one exception, the three thousand species described by Mr. Dognin are all American. There are also over three hundred species described by Thierry-Mieg, mostly American, the others European or Oriental, and quite a number of types described by Druce, Hampson, Jordan and Prout. The collection contains approximately:

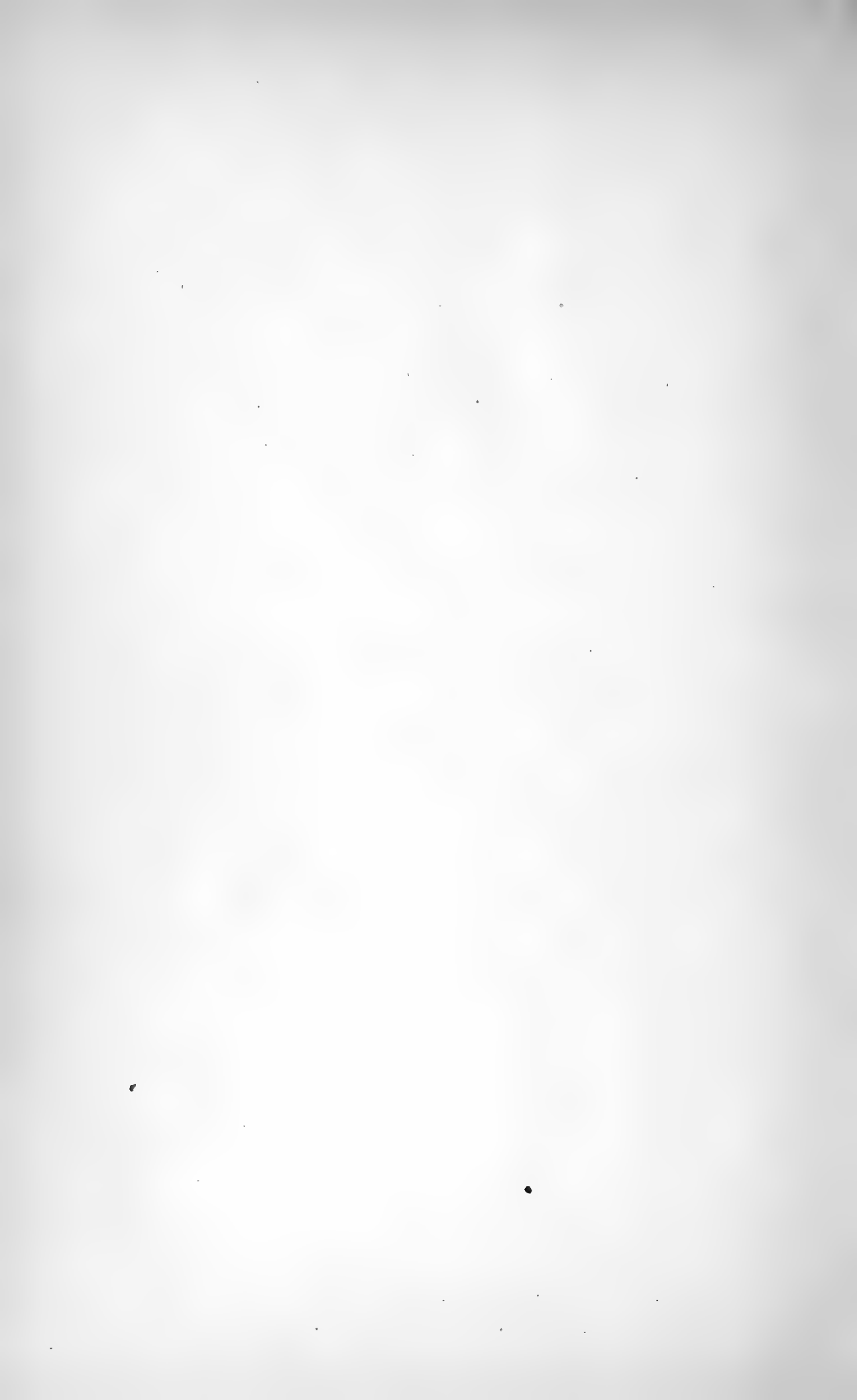
Amatidae	964	species,	4708	specimens.
Nolinae	48	“	140	“
Lithosiinae	293	“	1426	“
Arctiinae	969	“	5527	“
Noctuidae	2924	“	12963	“
Geometridae	4427	“	27724	“
Sphingidae	289	“	1417	“
Saturniidae	486	“	2119	“
Ceruridae	767	“	5610	“
Lasiocampidae	357	“	1809	“
Pyralidae	1193	“	6357	“
Micros	486	“	1246	“

The balance consists of Phalaenoididae, Liparidae, Callimorphidae, Eupterotidae, Melalophidae, Cymatophoridae, Dioptidae, Uraniidae, Psychidae, Cossidae, Pterophoridae, Megalopygidae, Limacodidae, Dalceridae, Castniidae, Zygaenidae, Hepialidae, etc.

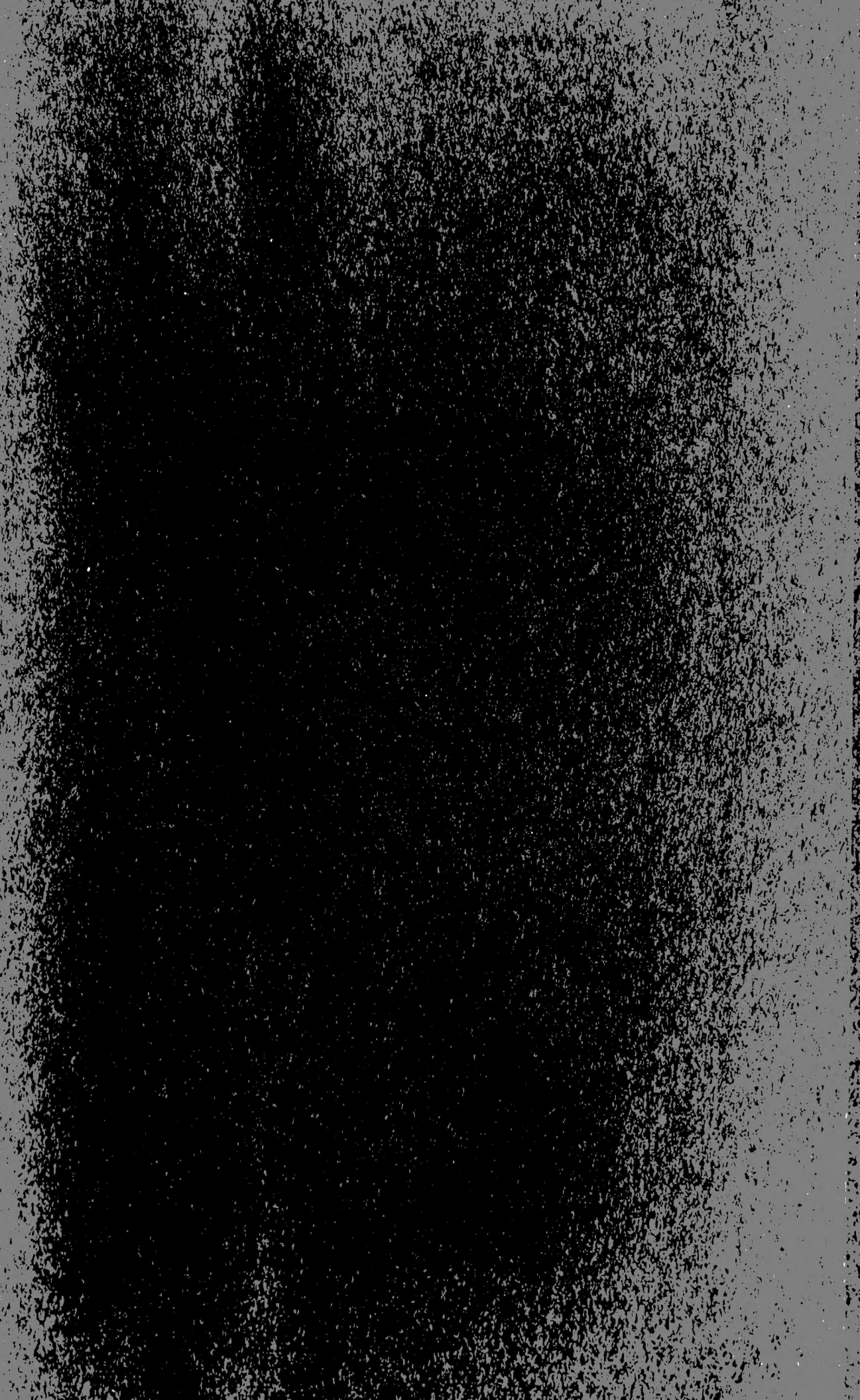
As soon as the full amount was raised for the purchase of the collection I, accompanied by my friend, Mr. J. T. Barnes, sailed early in June for France, and in five weeks of incessant work had packed and shipped the specimens to Washington, where they are now being unpacked and the types entered in the book kept for that purpose. Later on a paper will be published with more complete details of the interest and value of this exceptional collection.

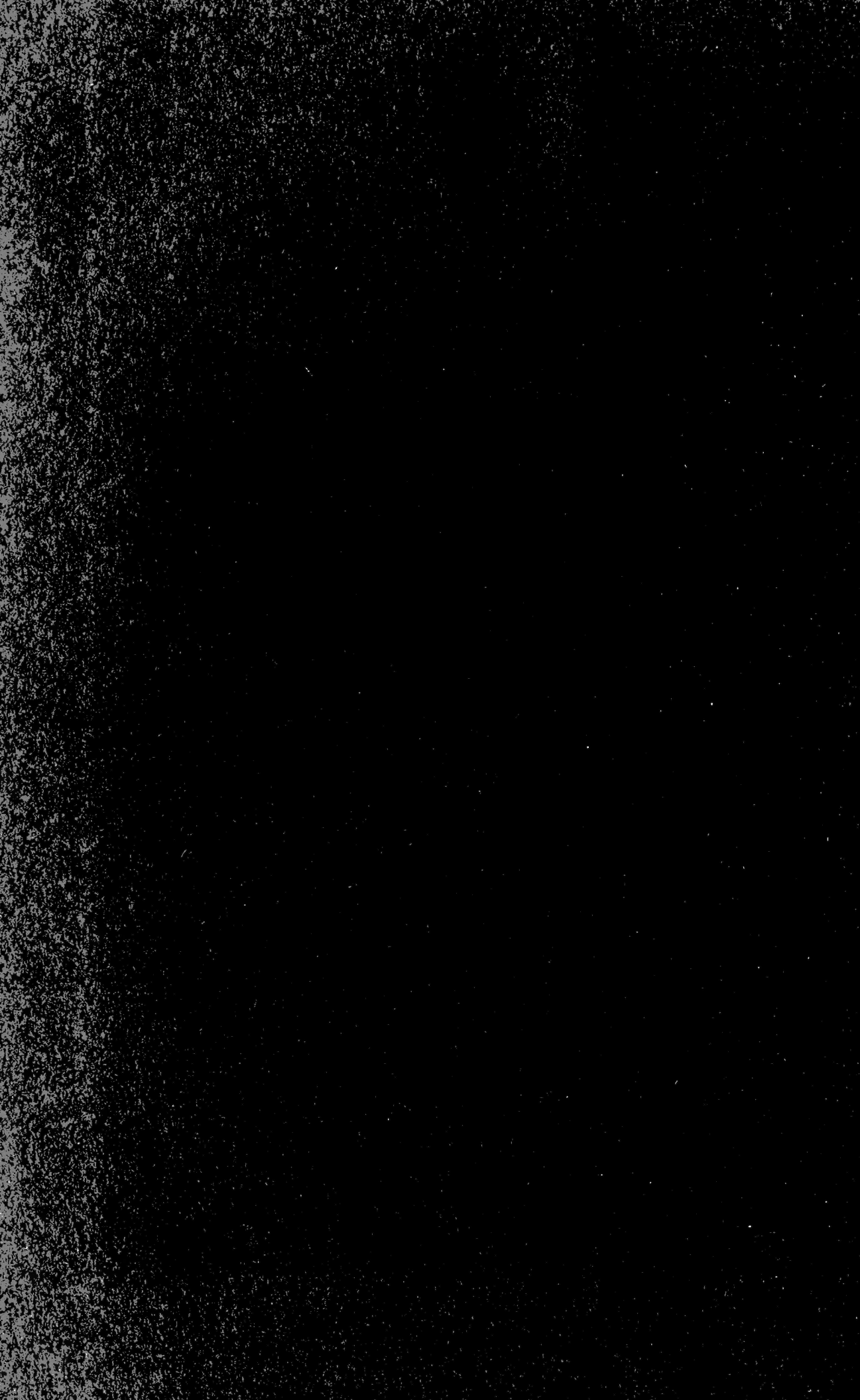
—*Wm. Schaus.*





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