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ERRATA.

Page 147, line 12.—Read "26,898" instead of "26,908."
Page 147, line 12.—From bottom: Read "*trivittatus*" for "*trivittata.*"
Page 151, between lines 12 and 13 from bottom.—Insert "Iowa (Wickham)."

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PROCEEDINGS OF THE

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ON THE NYMPHS OF THE APHIDINAE.

By Rhyoichi Takahashi, *Government Research Institute, Taihoku, Formosa.*

As the study of the immature stages of the family Aphididae has been practically neglected, I shall give in the following a general summary of the results of my studies on the nymphs of Aphidinae.

ECDYSIS.

The aphids, whether winged or wingless, usually moult four times and have, as a rule, four nymphal instars, but there are some exceptions. Davis records a case where a wingless form of *Aphis maidi-radicis* Forbes gave birth to six young, then moulted, became winged, and produced twenty-one more. According to Haviland, *Myzus ribis* L. sometimes shows a fifth moult subsequent to the birth of young; and it is claimed that an occasional fifth moult has likewise been noticed in *Macrosiphum pisi* Kalt. Kadomai observed that a moult took place after the birth of young in *Eriosoma lanigera* Hausm.

The moulting after sexual maturity observed in some aphids is known to occur in *Collembola* also, but not in other insects. Like *Collembola* the aphids are not provided with malpighian vessels, being in this respect unlike all other insects. This is in support of the theory that ecdysis perhaps has an excretory importance besides a provision for growth.

Ewing obtained what he called paedogenetic nymphs of *Rhopalosiphum avenae* Fab., but they were intermediates, adults between the winged and wingless condition, as pointed out by Baker. Paedogenesis does not occur in Aphididae. The number of moults is scanty in the sexes of *Pemphigus*, *Tetraneura*, *Eriosoma*, etc., as well as in the males of *Stomaphis*. These sexual forms are always apterous, with the rostrum rudimentary.

I have found that the apterous forms of the genera *Oregma* and *Astegopteryx* moult only three times, while their winged forms moult four times, the usual number for species of this family. The apterous forms of *Lachnus thujafoliae* Theob. also seem to have three nymphal instars. Pergande records three instars for the wingless forms and four instars for the

winged in *Hamamelistes spinosus* Shimer and *Hormaphis hamamelidis* Fitch.

According to Fuller, the apterous workers and soldiers of a termite community pass through fewer stages of growth than do their corresponding winged imagoes. Some apterous species of Gerridae and Veliidae have been recorded to have three or four nymphal instars, though five instars are common for heteropterous insects. In my opinion, these facts indicate that the apterous forms of paurometabolous insects have a tendency to fewer moults than the winged forms, a tendency due perhaps to the simplicity of body structure in the apterous forms.

MORPHOLOGY

With special reference to the metamorphosis.

As is well known, the postembryonic development of these insects is paurometabolous, and the structural differences between the young and full-grown nymphs are more distinct than those between the full-grown nymphs and the adults, especially so in the apterous forms, as in many other insects of Paurometabola. Each of the nymphal instars displays as a rule structural characters sufficient for the identification of the particular instar that it represents, but in *Shivaphis celti* Das, *Greenidea* and *Dilachnus* the third and fourth instars of the wingless form are scarcely different in structure from each other.

Aleyrodiform females of Hormaphidina.—As the metamorphosis of the aleyrodiform females of some genera of Hormaphidina, *Astegopteryx*, *Hamamelistes*, *Hormaphis* and *Cerataphis*, is very peculiar, it will be considered first.

The adults are very hard, almost black and aleyrodiform, and are firmly cemented to the host. In the first instar, the nymphs are pale in colour, due to the weaker pigmentation of the chitin. They are provided with well-developed legs and 3 or 4-jointed antennae and crawl over the host. In the second instar, they become stationary, have reduced antenna (often 2 or 3-jointed); the front and middle pairs of legs lack tarsi, and the hind legs are provided with single jointed tarsi, without claws. In the third or the last instar, the body becomes broader and the antennae more reduced; legs remaining almost as in the preceding instar. This metamorphosis very closely resembles that of some female Coccidae.

Other Aphidinae.—In the young nymphs, the body is often rather flattened, with the abdomen narrow. In the dimorphs or the first instar of *Periphyllus* specialized for aestivation, it is quite depressed and thin. The head is usually larger in proportion to the size of body in the young nymphs than in the

grown ones or adults. It is completely fused together with the pronotum in the genera *Cerataphis*, *Oregma*, *Astegopteryx*, *Aleurodaphis*, *Cervaphis*, *Neophyllaphis*, *Greenidea*, etc., except in the fourth instar and adults of the winged form. The dorsal surface of the head of some Lachnina (*Lachnus*, *Eulachnus*, etc.) is divided, though not distinctly so, by a longitudinal line which is distinguishable even in the first instar. In the nymphs of *Neophyllaphis podocarpi* Takah. it is likewise divided, though scarcely so in the adults. A pair of horns is present on the front, even in the first instar, in *Oregma* and *Cerataphis*. These are usually larger in the nymphal stages than in the winged adults. In the first instar of *Oregma bambusifoliae* Takah. the apices of the horns are rather pointed; in its later instars they are rounded. *Astegopteryx styracicola* Takah. and *A. styracophila* Karsch are provided with some short setae on the front of head. These are seen also in the wingless, but not in the winged adults. The frontal or antennal tubercles are absent in the young nymphs of the genera *Macrosiphum* and *Amphorophora*, appearing, however, with the first or second moult, gradually developing with the later moults and becoming distinct in the full-grown nymphs. In *Phorodon*, as well as in *Akkaia polygoni* Takah. they are distinct, being themselves provided throughout all the nymphal instars with a secondary tubercle smaller than that of the adult on the inner side. In the genus *Myzus* they are very short with the inner side distinctly gibbous, even in the first instar.

The eyes are smaller and usually less outstanding in the younger instars than in the adult stage, though in *Eulachnus* they are very distinctly protuberant even before the first moult. In the genera *Oregma*, *Cerataphis*, *Aleurodaphis*, *Astegopteryx*, *Neophyllaphis*, *Cervaphis*, etc., they are very small, being composed of only three facets, excepting in the full-grown nymphs of the winged form, in which they are of numerous facets as in the winged adults. In many species the ocular tubercles are not visible in the first instar, though three facets on the hind portion of the eye are larger than the remaining ones; but in *Rhopalosiphum nymphaeae* L., as well as in *Shivaphis celti* Das, they may be recognized even in the first instar. These ocular tubercles gradually become more distinct with growth. The facets on the ocular tubercles are always three in number; and in none of these insects have eyes been found which are composed of less than three facets. In my opinion, the three facets, of which the degenerated eyes of the apterous forms and most nymphs of *Oregma*, *Cerataphis*, *Astegopteryx*, *Cervaphis*, *Neophyllaphis*, etc., are composed, correspond to the facets on the ocular tubercles of other aphids. The ocelli are always absent during the nymphal life.

The rostrum is longer in proportion to the length of body

in the young instars than in the grown ones or adults, sometimes, as in the first instar of *Pterochlorus*, reaching beyond the end of the abdomen.

The sexes of *Pemphigus*, etc., as well as the males of *Stomaphis*, possess a rudimentary rostrum in the nymphal life and take no food, in this respect differing from the adults.

The antennae are shorter, stouter and less inbricated than in the adults. In the winged forms of some *Astegopteryx*, they are rather slender, inbricated and actively movable in the first instar. Later, however, they become quite stout, are not inbricated and hardly movable, being laid around the side of the head. The antennae are sometimes as many jointed as in the adults throughout all the nymphal instars, but usually are less jointed in the young nymphs than in the grown ones or adults. In the first instar they are usually 4 or 5, rarely 3, but never 6-jointed. According to Davis, the first instar of the first generation of *Macrosiphum pisi* Kalt. has the antennae less jointed than in the corresponding instar of other generations. In the full-grown nymphs they are usually as many jointed as in the adults. The mode of joint-multiplication is the same in all species. The new joints are abjucted from the third joint, not from others, and only one joint, not more, may be increased with any one moult from the first to fourth, as shown in the accompanying table. Each joint of each instar is usually longer than the corresponding joint of the preceding instar, but the third joint of the second or third instar is sometimes shorter than that of the preceding. The two basal joints are always very short and stout, as in the adults; they correspond to the scape and the remaining part to the flagellum in other insects. The first joint, in the genus *Neophorodon*, is furnished with a tubercle on the inner side, smaller than those of the adults. The third joint is destitute of hairs in the first instar, but is provided with them in the later instars in the genus *Macrosiphum*. The secondary sensoria are almost always wanting during the nymphal stage, but the grown nymphs of some *Dilachnus*, *Lachnys* and *Eulachnus* are furnished with a few secondary ones on the fourth or fifth joint. Each of the two last joints is always provided with a primary sensorium which is sometimes surrounded with a row of hairs as in the adults. The last joint also has some smaller sensoria in a group besides the primary one, even in the first instar. The filament or spur is as in the adults.

The thorax is very simple in structure, as no sclerites are distinguished even in the mesonotum of the full-grown nymphs of the winged form. In *Oregma*, *Cerataphis*, *Astegopteryx*, *Aleurodaphis*, *Neophyllaphis*, *Cervaphis*, *Greenidea*, etc., as mentioned already, the pronotum and the head are usually defined in the fourth instar and adults of the winged form; but

are completely fused together in other instars of the winged form as well as in all the stages of the wingless. The pronotum is furnished with a small lateral tubercle even in the first instar in the genera *Aphis* and *Rhopalosiphum*. The mesothorax of the winged form begins to develop, protruding on the side, in the third instar, and becomes larger, with the wing-pads well developed, in the fourth.

The wing-pads are usually dusky or pale greenish in colour, always lacking hairs and wax-pores, and are laid close to the side of the thorax, especially so in Callipterina. The hind pair of them is always smaller, being completely covered with the front pair in the fourth instar.

The legs are shorter and stouter than in the adults, with the tarsi 2-jointed and furnished with two claws. The first tarsal joint is smaller than the second as in the adults. In some Callipterina limpid empodial hairs are present even in the young nymphs, as in the grown ones or adults. Some Hormaphidina are furnished with a few very long capitate hairs on the tarsi which are sometimes imbricated even before the first moulting. In young nymphs of the genus *Periphyllus* the hind tibia is provided with some bristles arranged almost in a single row; these are much more abundant in the grown nymphs, but are not arranged in a row; in the dimorphs the front and middle pairs of tibiae have lamellae, but no normal hairs.

The abdomen becomes stouter with the process of growth. The lateral tubercles are recognizable even in the first instar in *Rhopalosiphum* and *Aphis*, while the dorsal ones which are very prominent in the winged adults are not seen in the nymphal stages of *Myzocallis pseudoalni* Takah. or *Callipterus kahawaluokalani* Kirk. In *Cervaphis* the abdomen, like the head and thorax, is provided with long projections which are branched in the grown nymphs, but not in the first instar. *Cavariella* is furnished above the cauda with a tubercle much smaller than that of the adult, even in the young nymphs, and in *Greenidea*, each of the seventh and eighth abdominal segments of the first instar is provided with a pair of tubercles which entirely disappear with the first moult. The dorsal tubercles on the seventh and eighth abdominal segments are very distinct in the genus *Akkaia*, being as large as or larger than those of the adults even in the young nymphs. *Setaphis viridis* v. d. Goot is armed with a pair of sharply pointed horns on the abdomen throughout all the nymphal instars.

The cornicles are shorter, stouter and less imbricated than in the adults, being never reticulated, and are especially shorter in the younger nymphs. In *Amphorophora*, they are less dilated in the young nymphs than in the grown ones or adults, and *Rhopalosiphum nymphaeae* L. possesses somewhat dilated cornicles even before the first moult takes place. In *Akkaia*

polygoni Takah., Lachinina, some Callipterina, Hormaphidina, etc., the cornicles of the immature stages are almost similar in shape to, but usually smaller than, those of the adults; while in *Chromaphis carpinicola* Takah. those of the full-grown nymphs are larger than those of the winged adults. In *Oregma*, *Cerataphis*, *Aleurodaphis*, *Astegopteryx*, etc., the cornicles are not recognizable during the first instar, appearing, however, with the first moult. In the first instar of some aphids they are very remarkable in structure. In *Dilachnus*, *Lachnus* and *Pterochlorus*, they are situated on the cones which are almost or entirely destitute of hairs and very short in the first instar, but are hairy and larger in the second and subsequent instars.

1.—Cornicle of the first instar of *Greenidea formosana* Maki.
2.—Cornicle of the second instar of the same.
3.—Cornicle of the first instar of *Greenidea kuwanai* Pergande.

The cornicles of the first instar, in *Greenidea*, are also very peculiar. They are conical in shape, have the opening at the apex very small, are not imbricated, entirely destitute of hairs, and resemble tubercles. With the first moult they become elongate and hairy, with the opening at the apex larger. The cornicles of *Cervaphis quercus* Takah. (like those of *Greenidea*) are without hairs in the first instar, but those of *Trichosiphonaphis* have some capitate ones in this stage.

The cauda is usually (especially so in the younger nymphs) shorter, stouter and less hairy than in the adults and is never constricted at the base or midlength. It is often wider than long; sometimes as long as wide in the grown nymphs of some Aphidina; and longer than wide in the fourth instar of the genus *Macrosiphum*. When seen from above, it is nearly triangular in shape with the apex rounded, and the cephalic margin broadly rounded, the latter sometimes to a semicircle. In *Myzocallis* and some other Callipterina, it is destitute of hairs,

and has the hind margin rounded, throughout all the nymphal instars.

The anal plate is very simple, never bilobed and usually not sinuated; but in *Greenidea* it is somewhat sinuated even in the first instar. In *Akkaia* it is not developed in the nymphs.

The genital opening is not seen in the immature stages.

The spiracles in number and arrangement are as in the adults. They are sometimes slightly protruding.

The hairs on the body, as well as on its appendages, are usually less in number in the young nymphs than in the grown ones or adults. In some *Periphyllus*, the dimorphs are provided with very peculiar hairs called "lamellae." The grown nymphs of the winged form of *Chromaphis carpinicola* Takah. are furnished with many bristles stouter and longer than those of the adults. In some *Myzocallis*, *Myzus*, *Neophorodon*, *Trichosiphonaphis* and *Capitophorus*, the nymphs of both the winged or apterous forms are furnished with a number of capitate hairs like those of the wingless adults. The winged adults have only normal hairs.

The wax-pores are as well developed in some species, even in the first instar of the winged or wingless forms as in the wingless adults. They are present in the winged adults of *Shivaphis celti* Das, but not in those of Hormaphidina. In *Oregma bambusifoliae* Takah. and *O. bambusicola* Takah. the wax-pores of all the instars of either the winged or wingless forms scarcely differ from those of the apterous adults in number, shape and distribution; but they do differ in some other species. In the full-grown nymphs of the winged form of *Oregma panicola* Takah. they are very small, and scattered over the head and thorax, but absent from the abdomen; while in the nymphs of the apterous form of the same species they are larger, circular and distributed as in *Oregma montana* v. d. Goot. In *Astegopteryx* and some of Hormaphidina, the nymphs of the wingless form have many wax-pores arranged in a single row along the whole margin of the body, while throughout all the nymphal instars the winged form has them arranged more in groups upon the dorsum.

SOME DIFFERENCES BETWEEN WINGED AND WINGLESS FORMS.

In the first and second instars, the nymphs of the winged form usually do not differ from the corresponding stages of the wingless, but in the third or fourth they always differ structurally. However, in some species of Hormaphidina, as mentioned already, the nymphs of the winged form, even in the first instar, distinctly differ from those of the apterous in the number and distribution of the wax-pores on the body.

TABLE OF ANTENNAL JOINTS.[1]

Species	Form	Number of Antennal Joints					Investigator
		nymph				adult	
		1st instar	2d	3d	4th		
Macrosiphum formosanum Takah.	V. ♀	5	5	6	6	6	Takahashi
Macrosiphum gobonis Mats.	Do.	5	5	6	6	6	Do.
Macrosiphum neoartemisiae Takah.	Do.	5	5	6	6	6	Do.
Macrosiphum pisi Kalt.	F.	4	?	?	?	6	Davis
Do.	V. ♀	5	5	6	6	6	Do.
Macrosiphum illinoiensis Shim.	F.	3	4 or 5	5	5	5	Baker
Do.	V. ♀	?	?	?	6	6	Do.
Do.	O. ♀	4	4	5	5	6	Do.
Myzus tropicalis Takah.	V. ♀	4	5	5 or 6	6	6	Takahashi
Amphorophora indica v. d. Goot	F.	5	5	5	5	5	Do.
Do.	V. ♀	5	5	6	6	6	Do.
Amphorophora oleraceae v. d. Goot	Do.	4	5	6	6	6	Do.
Cavariella neocaprae Takah.	V. ♀	4	5	5	5	5	Takahashi
Rhopalosiphum nymphaeae L.	Do.	4	5	5 or 6	5 or 6	6	Do.
Toxoptera nigra Baker	O. ♀	4	5	5	6	6	Baker
Toxoptera muhlenbergiae P. et D.	F.	4	5	5	5 or 6	6	Phillips and Davis
Aphis malvoides v. d. Goot	V. ♀	4	5	6	6	6	Takahashi
Aphis sambuci L.	Do.	4	5	5 or 6	6	6	Do.
Aphis maidis Fitch	Do.	4	4	5	5	6	Davis
Aphis pomi De Geer	F.	4	5	5	5	5	Baker and Turner
Do.	V. ♀	4	5	5	6	6	Do.
Do.	Sex	4	5	5	6	6	Do.
Aphis houghtonensis Troop	A. v. ♀	4	4	5	6	6	Baker
Aphis maidi-radicis Forbes	V. ♀	4?	5	5	5	6	Davis
Aphis sorbi Kalt.	F.	4	4	5	6	6	Matheson
Do.	V. ♀	?	?	6	6	6	Do.
Aphis malifoliae Fitch.	F.	4	5	5 or 6	6	6	Baker and Turner
Do.	V. ♀	4	5	6	6	6	Do.
Hyalopterus pruni Fab.	F.	5	5	5	5	5	Davidson
Do.	V. ♀	5	?	?	?	6	Do.
Greenidea kuwanai Pergande	Do.	5	5 or 6	6	6	6	Takahashi
Greenidea formosana Maki.	Do.	5	5 or 6	6	6	6	Do.

Cervaphis quercus Takah.	A. v. ♀	4	4	4	4	4	Do.
Do.	W. v. ♀	4	4	4	4	5	Do.
Myzocallis pseudoalni Takah.	Do.	4	5	6	6	6	Do.
Callipterus kahawaluokalani K.	Do.	4	5	6	6	6	Do.
Chromaphis juglandicola Kalt.	Do.	3	3	4	5	6	Davidson
Do.	Sex	?	?	?	6	6	Do.
Chivaphis celti Das.	V. ♀	5	5	6	6	6	Takahashi
Neophyllaphis podocarpi Takah.	Do.	4	5	6	6	6	Do.
Chaitophorus sp.	Do.	4	5	?	6	6	Do.
Periphyllus acerifoliae Takah.	V. ♀	4	5	6	6	6	Takahashi
Do.	F.	4	5	5	5	5	Do.
Sipha flava Forbes	V. ♀	4	4	4	4	5	Davis
Dilachnus piniformosanus Takah.	Do.	4	5	6	6	6	Takahashi
Dilachnus pinidensiflorae Essig et Kuw.	Do.	4	5	6	6	6	Do.
Lachnus thujafoliae Theob.	Do.	4	5	6	6	6	Do.
Eulachnus piniformosanus Takah.	Do.	4	5	6	6	6	Do.
Oregma bambusifoliae Takah.	A. v. ♀	4	4	4	....	4 or 5	Do.
Do.	W. v. ♀	4	4	5	5	5	Do.
Astegopteryx quercicola Takah.	A. v. ♀	3	2	1	....	1	Do.
Do.	W. v. ♀	3 or 4	5	5	5	5	Do.
Aleurodaphis blumeae v. d. Goot.	A. v. ♀	4	4	4	....	4 or 5	Do.
Do.	W. v. ♀	4	?	?	5	5	Do.
Hamamelistes spinosus Shim.	F.	4	4	4	....	4	Pergande
Do.	A. v. ♀	4	3	3	....	2 or 3	Do.
Do.	W. v. ♀	4	5	5	5	5	Do.
Hamamelistes betulae	A. v. ♀	4	4	4	4	5	Tullgren
Hormaphis hamamelidis Fitch.	F.	3	3	3	....	3	Pergande
Do.	A. v. ♀	3	2 or 3	1	....	1 or 2	Do.
Do.	W. v. ♀	3	3	3	3	3	Do.
A Hormaphid on *Populus*	Do.	3	3	3	3	4	Takahashi
Tetraneura sp. on *Ulmus*	Do.	5	5	6	6	6	Do.
Eriosoma lanigera Hansm.	A. v. ♀	5	5	5 or 6	6	6	Baker
Nurudea shiraii Mats.	Do.	?	?	?	?	4	Takahashi
Do.	W. v. ♀	?	?	?	5	5	Do.

Abbreviations used in the table. A. v. ♀—Apterous viviparous female. F.—Fundatrix or stem-mother. O. ♀—Oviparous female. W. v. ♀—Winged viviparous female. V. ♀—Viviparous female, both winged and wingless.

[1]In giving the number of the antennal joints, the author, of course, has not counted the filament or spur of the last joint as a separate and distinct joint.

This might be taken as an indication that, in some species at least, the production is not determined by external factors operating after the birth of the insect.

In some Hormaphidina, as already stated, the antennae and legs of the nymphs of the aleyrodiform female become more reduced with the process of growth, while those of the nymphs of the winged form develop more in the later instars. In the third instar of the winged form, the mesothorax is developed, the wing-pads beginning to appear, and the third antennal joint is often longer than that of the corresponding stage of the wingless. The third antennal joint of the winged form, in *Oregma bambusifoliae* Takah., etc., is longer than that of the wingless even in the second instar; and in the grown nymphs of some Pemphigina and Hormaphidina, the antennae of the winged form are longer and more jointed than those of the wingless. In the fourth instar of the winged form, the wing-pads are well developed.

The eyes of *Oregma*, *Cerataphis*, *Aleurodaphis*, *Astegopteryx*, *Neophyllaphis*, *Cervaphis*, etc., are composed of three facets in all the instars of the wingless form, as well as in the first three instars of the winged, while they are of numerous facets in the fourth instar of the winged nymphs as they are in the winged adults. In the fourth instar of the winged forms of the genera *Oregma*, *Aleurodaphis*, *Astegopteryx*, *Neophyllaphis*, *Cervaphis*, *Greenidea*, etc., the head and pronotum are usually defined. In other instars of the wing form and all instars of the nymphs of the wingless they are fused together.

In *Oregma panicola* Takah. the grown nymphs of the winged form, as mentioned already, are provided with numerous very small wax-pores scattered over the dorsum of the head and thorax, while those of the wingless have some larger circular ones distributed as in *Oregma montana* v. d. Goot. The nymphs of the brachypterous form usually do not differ from those of the normally winged one.

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A NEW SPECIES OF BRACHYS FROM ARIZONA (COLEOPTERA: BUPRESTIDAE).

By W. S. Fisher, *U. S. Bureau of Entomology.*

In rearranging the leaf-mining Buprestidae in the United States National Museum Collection, the following new species was found.

Brachys barberi, new species.

Male.—Broadly ovate, two times as long as wide, broadly rounded in front, and slightly more acuminate posteriorly, moderately shining and sparsely pubescent, the pubescence forming three more or less distinct fasciae on the elytra; head and pronotum piceous, with a strong aeneo-cupreous tinge; elytra piceous, with a strong bluish or purplish tinge, and becoming feebly aeneous at base and along the suture; beneath piceous, with a rather strong aeneous reflection.

Head feebly convex, transversely flattened behind the epistoma, and without distinct gibbosities on the vertex, broadly and rather deeply longitudinally grooved from occiput to near the epistoma, the groove becoming more shallow on the occiput; surface finely and irregularly punctate, the punctures rather densely placed near the epistoma but becoming more obsolete and widely separated posteriorly, rather densely clothed with long recumbent reddish-yellow hairs, and the intervals nearly smooth; epistoma rather wide between the antennal cavities, flat, and not transversely carinate in front. Pronotum moderately convex, two and one-half times as wide as long at middle, distinctly narrower in front than behind, and widest at the base; sides feebly sinuate and obliquely attenuate from base to anterior angles (when viewed laterally the margin is abruptly arcuate near the posterior angles for the reception of the anterior legs); anterior margin transversely truncate; base transversely truncate to middle of each elytron, where it is distinctly arcuately emarginate, then turning obliquely backward to the scutellum, in front of which it is feebly arcuately emarginate; posterior angles nearly rectangular; surface broadly depressed at the sides, the depression extending obliquely from the anterior angles to the base at middle of elytron, then transversely along base, causing the antero-median part of the disk to be regularly convex, there is also a small oblong gibbosity on each side in the depressed area near the posterior angles, the surface with feebly impressed ocellate punctures, sparsely placed on the disk, but becoming denser in the depressed areas, sparsely clothed with long recumbent reddish-yellow hairs, and the intervals obsoletely granulose. Scutellum triangular, with the anterior margin feebly arcuately rounded and the surface obsoletely granulose. Elytra as wide as pronotum at base; humeral angles obtusely angulated; sides nearly parallel to middle (strongly sinuate at basal fourth), then arcuately attenuate to the tips, which are conjointly broadly rounded, with the lateral margin entire; humeri prominent. Each elytron with a broad, deep depression at the base, and a narrow one between the humerus and lateral margin, and with a distinct lateral carina, which is sinuate and strongly elevated, extending from the humeral angle to near the apex, there is also a more or less distinct carina between the lateral carina and the suture,

situated closer to the former, but not extending to the base nor apex, with three or four fine lines of fulvous hairs extending from base to near apex, and with three more or less distinct fasciae arranged as follows: An irregular, rather obsolete one composed of short cinereous hairs, extending from the scutellum obliquely backward to the lateral margin behind the humerus; a narrow zigzag one near the middle, very irregular in shape, and bent backward along the suture; and a broad one covering the apical fifth, composed of cinereous hairs bordered posteriorly with fulvous hairs and enclosing a round glabrous spot; the surface finely and irregularly punctate, the punctures becoming more distinct toward the base, and the intervals smooth and shining. Abdomen beneath sparsely ocellate-punctate, the punctures large, shallow, open posteriorly, and from the center of each puncture arises a short recumbent cinereous or fulvous hair; intervals finely granulose; last segment broadly rounded at apex, with the margin entire, and the apical groove following the outline of the posterior margin.

Female.—Differs from the male in having the head more transversely flattened behind the epistoma, not quite as densely punctured, more sparsely pubescent, and the median groove more deeply impressed; last abdominal segment broadly rounded at apex, the margin armed with a series of regularly placed narrow, parallel teeth, the apical groove subtruncate, strongly sinuate, and the area in front of the apical groove broadly arcuately emarginate, without a series of long hairs.

Length, 4.7 mm.; width, 2.4 mm.

Type locality.—Williams, Arizona.

Other localities.—Las Vegas Hot Springs, New Mexico.

Type, *allotype* and *paratypes.*—Cat. No. 26778, U. S. N. M.

Described from a series of seven specimens, two males and five females, six of which were collected at the type locality during May, June and July, by Messrs. Barber and Schwarz, and the other specimen taken at Las Vegas Hot Springs, New Mexico, August 3, by the same collectors.

The species is closely allied to *Brachys ovatus* Weber, with which it may be confused in collections, but it can be separated from that species by the head and pronotum being more aeneo-cupreous, and the pubescence on the elytra more abundant. In rubbed specimens the males may be difficult to separate, but the females can be easily separated on the structure of the last abdominal segment. In *ovatus* the apex is subtruncate and the apical half of the segment deeply concave, with a row of long densely placed pale yellow hairs along the edge of the concavity, while in *barberi* the last abdominal segment is broadly rounded at apex, with a strongly sinuate apical groove, and the area in front of the groove broadly arcuately emarginate, and without the row of densely placed long hairs.

THE IDENTITY OF CONOHALICTOIDES NOVAEANGLIAE ROBERTSON.

By H. L. Viereck.

The regularity with which *Conohalictoides novaeangliae* Robertson visits solely *Pontederia cordata* in the Eastern United States led me to believe that the *Halictoides novaeangliae* recorded by Dr. Craenicher, Can. Ent., 42 (104), 1910 might prove to be another species since Dr. Craenicher's specimens were caught invariably visiting flowers of *Monarda fistulosa* and *Agastache foeniculum*. Accordingly I wrote to Mr. T. E. B. Pope, Curator, Public Museum, Milwaukee, Wisconsin, for the loan of Dr. Craenicher's material. This request being granted, I, thanks to the courtesy of Mr. Pope, Dr. Skinner, Mr. Rohwer and Mr. Haimbach, assembled twenty-nine specimens in addition to four of my own. Of these thirty-three specimens fifteen are females and eighteen are males. I could detect no tangible difference between the females although among the males I found two types according to the structure of the sixth, seventh and eighth sternites and the genitalia. For the bee that visits *Monarda fistulosa* and *Agastache foeniculum* I propose the name *Conohalictoides* **monardae** new species although I can not separate the females of this species from the females of *C. novaeangliae* Robertson visiting *Pontederia cordata*. The accompanying figures graphically show the difference in the male genitalia of these species and in the sixth and eighth sternites.

The localities for the females are as follows: Chestertown, Maryland, August 12, 1901, one specimen [A. N. S. P.]; Castle Valley, Bucks Co., Pennsylvania, July 16, 1922, ten specimens [F. Haimbach]; Maiden Rock, Pierce Co., Wisconsin, August 4–10, 1910, No. 39037, one specimen; Genoa, Wisconsin, (Vernon Co.), July 7–12, 1911, No. 50770, one specimen; N. Hudson, St. Croix Co., Wisconsin, August 13, 14, 1909, No. 30400, one specimen [Public Museum, Milwaukee, Wisconsin]; Maiden Rock, Pierre Co., Wisconsin, August 4, 10, 1910, No. 39036, one specimen [U. S. N. M.].

The data for the males is as follows: *C. monardae* Viereck, type, figured, Wausau, Wisconsin, August 7, 1910, No. 47335; Randall, Burnett Co., Wisconsin, August 5–7, 1909, No. 29762, one specimen; Namekagan River, Burnett Co., Wisconsin, July 25, 26, 1909, Nos. 29025, 29028, two specimens, one of these with oblique carinae on the sixth sternite like in *novaeangliae* but with hind trochanters stubbily produced as in typical *monardae* not conically produced as in *novaeangliae* [P. M. M. W.]; Namekagan River, Burnett Co., Wisconsin, July 25, 26, 1909, Nos. 29026, 29027, two specimens. [U. S. N. M.] *C. novaeangliae* Robertson, specimen figured, Analostan Island, Little River, Washington, D. C., July 15, 1916, on flowers of *Pontederia cordata*, two

specimens; Tullytown, Bucks Co., Pennsylvania, July 9, 1922, on flowers of *Pontederia cordata*, two specimens [Collection H. L. Viereck]; Castle Valley, Bucks Co., Pennsylvania, July 16, 1922, seven specimens [F. Haimbach]; Hampton, New Hampshire, July 17, 1910, No. 76, S. A. Shaw, [U. S. N. M.].

Comparison of these species with *Halictoides dentiventris* Nylander, determined by Friese, the genotype of *Halictoides*, reveals at least a subgeneric difference in the shape of the head, etc. *H. dentiventris* Nyl. has simple hind coxae in the male, a radically different set of genitalia and a simple sixth sternite than in *Conohalictoides*.

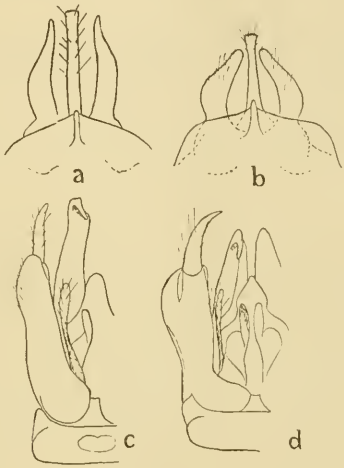


Fig. 1. Details of *Conohalictoides:* a=sixth, seventh and eighth sternites of *C. novaeangliae;* b=sixth, seventh and eighth sternites of *C. monardae;* c=hypopygium of *C. novaeangliae;* d=hypopygium of *C. monardae.*

NOTES ON SOME GENERA OF DERBIDAE (HEMIP.).

By F. Muir, *Hawaiian Sugar Planters' Experiment Station, Honolulu, H. T.*

During a visit to Stockholm last summer I had the pleasure of examining a number of Stal's historic types of Homoptera in the Naturhistoriska Riksmuseets. This has enabled me to correct some wrong ideas which I held respecting certain genera. I take this opportunity to thank Dr. Yngve Sjostedt for placing the conveniences of the museum at my disposal during my stay, and Dr. A. Roman for the trouble he went to on my behalf and the time he placed at my disposal.

LAMENIA Stal.

Lamenia Stal, Eugenies Resa Ins. p. 277 (1859); haplotype.—*caliginea* Stal.

The type material of this species consists of one female from Tahiti which appears to be the same species that I have from Samoa. The tegmen is fairly narrow and the costal and hind margins subparallel, the Sc cell is short, Sc and R being joined together to well beyond the middle of tegmen. There is no distinct shoulder keel but there is a distinct subantennal process joined to the gena by a wide base. The vertex is a little longer than wide, the frons comparatively narrow and without a median longitudinal carina; the lateral carinae are fairly large; the clypeus is tricarinate.

Thyrocephalus Kirkaldy is the same as *Lamenia*. The genus *Vekunta* Dist. comes close to *Lamenia* but there is no distinct subantennal process. A few species which I have placed in *Vekunta* have an obscure carina or ridge but it can not be mistaken for a subantennal process as found in *Lamenia*.

HERPIS Stal.

Herpis Stal, K. Sven. Vet Akad. 3. (6) p. 8 (1860).

This genus was erected for five species from Rio Janeiro of which *fusco-vittata* Stal is the type. In 1866 in a footnote in Hemiptera Africana VI, p. 193, Stal sank this genus into *Lamenia* but they can not be considered as the same. The type material of the type species consists of one female specimen with one tegmen missing; the Sc cell is long, Sc and R forking about one-third from base; Mf about middle of tegmen with six apical veins, M 1, 2, 3, 3a, 3b, 4; claval veins forking near apex of clavus and joining the claval suture; Cu 1 and Cu 1a joining before margin. No subantennal process; shoulder keels well developed; frons fairly broad, subparallel sided, with a faint carina down middle; vertex about as broad as long.

The genus *Syntames* Fowler I consider to be the same as *Herpis*. It has five apical Ms 1, 1a, 2, 3, 4, and Cu 1 does not join Cu 1a but these characters are probably not generic. For the present I shall consider them as synonyms. *Phaciocephalus* Kirk is close to *Herpis* but it has no median frontal carina. *Herpis orba* Stal, *Herpis pallidovenosa* Stal and *Herpis fimbriolata* Stal I would place in *Phaciocephalus* Kirk if the two genera are to be kept apart. *Herpis lugubrina* belongs to *Cedusa* Fowler.

CEDUSA Fowler.

Cedusa Fowler, Bio. Cent. Amer. Hom. I, p. 112 (1904); type.—*funesta* Fowler.

Fowler placed this genus in the Achilidae but it belongs to the Derbidae. It differs from *Herpis* and its allies in having a

distinct subantennal process and also shoulder keels which are sometimes small but distinct. There is no medio-frontal carina or only a very obscure one. The Sc cell is long, the Sc and R forking considerably before the middle of tegmen. M forking about level with node, with six apical veins, M 1, 1a, 1b, 2, 3, 4. The vertex is much broader than long. The shape of the tegmina distinguishes it from *Neocyclokara* Muir. *Poeciloptera vulgaris* Fitch and some other North American species hitherto generally listed under *Lamenia* belong to this genus.

The genus *Cenchrea* Westwood has a short subcostal cell, shoulder keels well developed and no subantennal process.

PHENICE Westwood.

Phenice Westwood, Ann. Mag. Nat. Hist. VI, p. 478 (1841); Trans. Linn. Soc. Lond. XIX, p. 10 (1842). Muir, Ent. Mo. Mag. (3) IV, 1918, pp. 207, 235.

When discussing this genus in 1918 I had not seen the type and provisionally accepted the named specimens in the British Museum as being correct. The genus was erected for *Derbe fritillaris* Boh., *Derbe fasciolata* Boh., and *Derbe stellulata* Boh., and as the generic description was based upon *D. fasciolata* and that species was figured it must be the type.

The type material of *Derbe fasciolata* consists of one male specimen collected by Afzel in Sierra Leone. It has no subantennal processes and no shoulder carina. The clavus is narrowly open and the claval vein touches Cu 1a, apart from the claval suture. Cu has two branches, Cu 1 and Cu 1a, both of which reach the hind margin. M has seven branches which are pectinate, the first or basal sector is bifurcate near its base and represents M 3–4, the others are simple. R and Sc fork near the base, the Sc cell being long and narrow; the R cell is also long and narrow. Hind wing two thirds the length of tegmen, anal area developed. In profile the vertex and frons round; the antennae are nearly as long as face, cylindrical or slightly flattened.

The type material of *Derbe stellulata* Bohm. consists of one female collected by Afzel in Sierra Leone and it is typical of the genus *Phenice*. *Derbe fritillaris* belongs to the genus *Proutisa* Kirkaldy to which *Phenice moesta* Westw. also belongs. Unfortunately the latter was considered typical of the genus for a long time and led to some confusion. Kirkaldy never recognized that *Phenice* belonged to the Derbinae and *Proutista* to the Zoraidinae. The genus *Phenice* comes near to *Dawnaria* Dist., but it is easily recognized from it by the pectinate form of the Ms and the longer antennae. *Phenice furcata-vittata* Stal from Java is a *Proutista*.

PARAPHENICE, new genus.

The examination of the type material of *Phenice fasciolata* (Bohm.) shows that the species which I formerly placed under *Phenice*[1] belong to a genus which at present has no name and for which I propose the name *Paraphenice* type *Phenice neavei* Muir.[2]

Vertex much longer than width at base, base wider than apex, lateral carinae not meeting together at apex. Frons much longer than wide (about 4 to 1), lateral carinae not touching. Length of antennae less than half the length of face, length of second segment about twice the width, arista at apex. Subantennal process well developed; shoulder keels very small. Mesonotum tricarinate. Sc+R forking near base, Sc cell long and narrow, R cell long and narrow; M pectinate with five sectors, the first or basal sector furcate near its base and in intimate connection with, and appearing as pertaining to, the cubitus. Cu with two branches, Cu 1 and Cu 1a, the latter joining the extended suture and not reaching the hind margin; clavus narrowly open; claval fork near middle. Wings about two-thirds the length of tegmina; anal area well developed with anal veins.

This genus is easily separated from *Phenice* by the presence of the subantennal process and by the smaller antennae.

FLACCIA Stal.

This genus is the same as *Lyricen* Kirkaldy and *F. conspersa* Stal=*L. imthurni* Kirk.

PEGGIA Kirkaldy.

The type of this genus is *Nebrissa nitida* Stal and the type material consists of one female specimen which enables me to state the following synonymy:

Nebrissa Stal, Ofv. Vet. Akad. Forh 27, 751 (1870) name preoccupied.
Peggia Kirkaldy, Entomologist (1901) 34. 6, new name.
Mindana Muir, Philip. Journ. Sci. D. 12 (1917) 94, name preoccupied.
Leurometopon Muir, op. c. 20. 3 (1922) 349, new name.
Nebrissa nitida Stal=*Mindana latifrons* Muir.

Peggia irrorata Muir (Philip. Journ. Sci. D. 12 (1917), 87), can be placed in *Zoraida* subgenus *Peggiopsis* until the genus is revised.

Zoraida westwoodi (Stal) is represented in the Museum by one male, the type, and it is not the same as the species identified by me as such (Philip. Journ. Sci. XII, D. 2, p. 82 (1917)). The species therein described and wrongly named *westwoodi* (Stal) I now name **Zoraida falsa** Muir.

[1]—[2]Ent. Mo. Mag. 1918, p. 235.

RAIZODA, new genus.

Deribia signoreti Coquerel is represented in the Museum by several specimens which may be part of the type material. I consider it as the type of a new genus.

In the tegmen the first or basal median sector is furcate, the Cu is free from the first median sector, Cu 1 enters the hind margin direct and Cu 1a joins the claval vein and enters the hind margin. Sc and R fork slightly before the middle of tegmen; Sc cell fairly large; R cell fairly large, slightly broadened on apical third; M with four sectors. Wings about half the length of tegmen. Antennae small, with arista at apex. Clypeus longer than face. Head in profile round. Female genital styles abortive.

This genus approaches *Zoraida* and allies in having the first or basal median sector furcate but it is not so intimately connected to the cubital system. It differs from these genera in having small antennae. The *Proutista* group either have none of their median sectors furcate or they have the third (counting from the base upward). The genus *Deribia* belongs to the Otiocerine (Derbinae).

EVIDENCE THAT THE MEXICAN BEAN BEETLE WAS PRESENT IN THE UNITED STATES AS EARLY AS 1850.

By F. H. Chittenden.

In 1920 the writer made the statement[1] that the "bean ladybird" was, as is well known, described originally in 1850 from Mexico and that injuries were first noticed at about that time. This statement was based on a letter from Judge J. F. Wielandy, dated July 23, 1889, that *Epilachna corrupta* Muls. had been known by its injuries at Watrous, N. Mex., 40 years earlier than the date of writing, which would be about 1849. This will make a period of at least 74 or approximately 75 years that the species has been known to occur in New Mexico. The object of this note is to call attention to the fact that this matter has been overlooked by most writers who have published in regard to this species since 1920. Where an error has once been perpetrated, it is apt to be repeated indefinitely until corrected.

[1]Bull. 843, U. S. Dept. Agric., p. 10.

A NEW SUBGENUS OF NASUTITERMES BANKS (ISOP.).

By Thos. E. Snyder, *U. S. Bureau of Entomology.*

There has been considerable discussion among workers on termites in regard to the status of some of the subgenera established by the distinguished Swedish entomologist, Nils Holmgren. In some cases authors have considered subgenera worthy of generic rank. In others there is doubt as to the validity of the subgenera.

The subgenera under *Kalotermes* Hagen and the subgenera under *Nasutitermes* Banks (*Eutermes* Fritz Müller) are especially interesting. In *Kalotermes* the subgenus *Neotermes* Holmgren is of doubtful validity. Material in collections in the United States leads me to believe it would be advisable not to separate species under *Neotermes* from *Kalotermes*.

In the case of *Nasutitermes* there are new species in collections in the United States which are intermediate in position between some of Holmgren's subgenera; for example, between *Diversitermes* and *Velocitermes*. On the whole, however, Holmgren's classical work shows breadth of vision based on a survey of collections from all over the world and I believe the subgenera should be considered valid until more material is at hand.

The new subgenus herewith described differs from any known to the writer. The type species is from Panama.

The termite fauna of the Canal Zone and adjacent areas of the Republic of Panama, while not consisting of a large number of species (only 26 are known), contains some very interesting forms in the 15 genera or subgenera occurring in this region.

Genus **NASUTITERMES** Banks.

OBTUSITERMES, new subgenus.

Soldier.—Two types of soldiers; head slightly (in large soldier) or greatly (in small soldier) constricted behind antennae. Mandibles without points. Nasus conical, fairly elongate and thick.

Outlines of head of soldiers somewhat similar to the large and intermediate soldiers of species in the subgenus *Diversitermes* Holmgren. Antennae with 11 segments. Legs relatively short—length of hind tibia much less than length of entire head.

Post-clypeus of *worker* nearly as long as half its width.

Small, light colored species.

Genotype.—Nasutitermes (*Obtusitermes*) *biforma* Snyder from Quipo, Republic of Panama.

Nasutitermes (Obtusitermes) biforma, new species.

Large soldier.—(Plate 1, figs. 1, 2). Head light yellow-brown, pale posteriorly but light castaneous-brown anteriorly, nasus light castaneous-brown with

reddish tinge; broader posteriorly than anteriorly, gradually narrowing (converging) towards anterior margin, slightly constricted behind antennae, convex in profile, with slight depression about center of head, with short hairs but few long hairs (two transverse rows, one anteriorly, the other posteriorly), and numerous short hairs; nasus conical, somewhat thick, slightly upturned at apex, with short and few long hairs near apex. Mandibles without points.

Antennae light yellow-brown, with 11 segments, pubescent; third segment subclavate, slender, longer than second or fourth segments; fourth segment shorter than second; segments becoming broader and longer from fourth segment to apex; last segment elongate, narrow and sub-elliptical.

Pronotum yellow, yellow-brown at anterior margin where slightly emarginate, saddle-shaped; posterior margin nearly a straight line; with short hairs.

Legs white with tinge of yellow, relatively not very long, slender, pubescent.

Abdomen yellow; with row of long hairs at base of each tergite, also short hairs on tergites.

Measurements:

Length of entire soldier: 2.50–2.85 mm.
Length of head with nasus: 1.0–1.1 mm.
Length of head without nasus (to anterior): 0.67 mm.
Length of nasus: 0.35–0.37 mm.
Length of pronotum: 0.11 mm.
Length of hind tibia: 0.57–0.60 mm.
Width of head (at posterior where broadest): 0.60–0.62 mm.
Width of head (at anterior): 0.42 mm.
Width of pronotum: 0.36–0.37 mm.

Small soldier.—(Plate 1, figs. 3, 4). Head of slightly lighter color than large soldier, nasus appears relatively darker, hairs the same; head broader anteriorly than posteriorly, markedly constricted in middle, in profile showing marked depression at center of head posterior to elevation at base of nasus; nasus conical, slender and slightly pubescent, upturned at apex as in large soldier; mandibles without points.

Antennae light yellow-brown, 11 segments, pubescent; third segment subclavate, slender, longer than second or fourth segments; fourth segment shorter than second; segments from fourth to apex becoming broader and longer; last segment elongate, narrow and sub-elliptical.

Measurements:

Length of entire soldier: 2.35–2.70 mm.
Length of head with nasus: 0.90–0.93 mm.
Length of head without nasus (to anterior): 0.57 mm.
Length of nasus: 0.32 mm.
Length of pronotum: 0.10 mm.
Length of hind tibia: 0.52–0.55 mm.
Width of head (at anterior where broadest): 0.42 mm.
Width of head (at posterior): 0.37 mm.
Width of pronotum: 0.36 mm.

Type locality.—Quipo, Republic of Panama.

Described from a series of two types of soldiers collected with workers at the type locality, May 18, 1923, by Messrs. I. Molino and J. Zetek. The termites completely riddled a small dead branch among leaf mold. Quite a few specimens of both the large and small soldiers of *Obtusitermes biforma* Snyder were also found with other termites, ants, etc., in the stomach of a Chiriqui three-toed anteater (*Tamanduas tetradactyla chiriquensis* Allen) killed by R. C. Shannon on Barro Colorado Island (Erwin's Island), Gatun Lake, C. Z., Panama, on June 17, 1923.

Type, soldier.—Cat. No. 26369, U. S. N. M.

Obtusitermes aequalis, new species.

Large soldier.—Head yellow-brown, paler posteriorly and at base nasus castaneous-brown, broader posteriorly than anteriorly, narrows (converging) towards anterior margin, slightly constricted behind antennae, nearly straight but slightly convex in profile and with slight depression at about center of head; with fairly long hairs but also with numerous longer hairs; nasus *conical*, somewhat thick at base and slightly upturned at apex, with short and few long hairs near apex. Mandibles blunt, without points.

Antennae light yellow-brown with 11–12 segments pubescent; second, third and fourth segment subequal; segments become longer and broader toward apex; last segment slender, elongate, subeiliptical.

Pronotum yellow-brown, darker at anterior margin, where slightly emarginate, saddle-shaped, elongate, not sharply upraised; anterior margin with long hairs; posterior margin nearly at straight line.

Legs yellowish, relatively not very long, slender, pubescent.

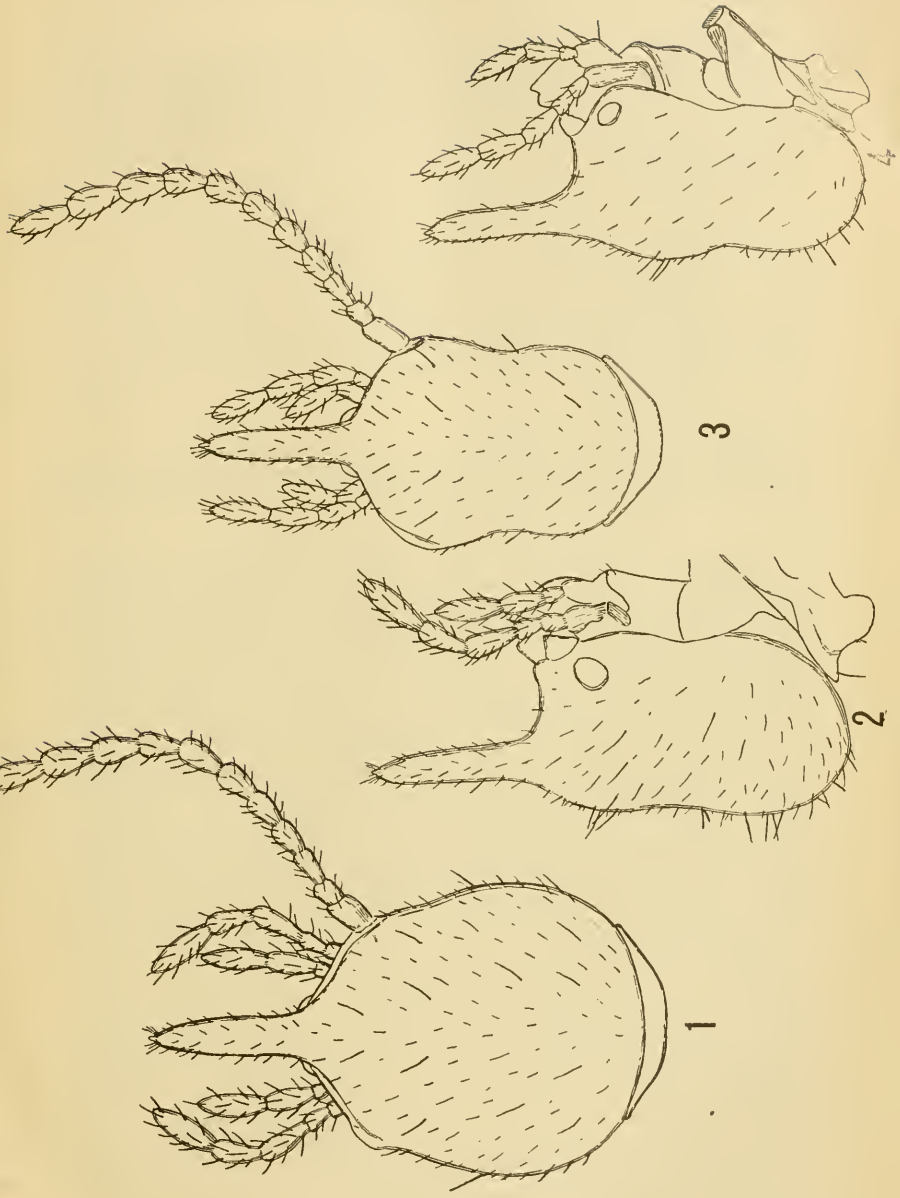
Abdomen yellow-brown, with dense fairly long hairs and rows of longer hairs at base of each tergite.

Measurements:

Length of entire soldier: 2.80–2.90 mm.
Length of head with nasus: 0.97–1.0 mm.
Length of head without nasus (to anterior): 0.60 mm.
Length of nasus: 0.37 mm.
Length of pronotum: 0.15–0.16 mm.
Length of hind tibia: 0.60 mm.
Width of head (at posterior where broadest): 0.60 mm.
Width of head (at anterior): 0.45 mm.
Width of pronotum: 0.30 mm.

Worker: Head yellow-brown, with prominent white longitudinal line, meeting epicranial suture at frontal gland; antennae with 13–14 segments; length of post-clypeus nearly one-half its width.

This species is referred to the subgenus *Obtusitermes* which contains species with two types of soldiers. In connection with *aequalis*, however, only one (the large type) was found. *Aequalis* is darker colored than *biforma* Snyder and differs in size.



SNYDER—OBTUSITERMES

Type locality.—Camagüey, Cuba.

Described from seven soldiers (large type) found with workers at The Colony "Elia" at the type locality, July 11, 1923, in a stalk (stump) of sugar cane by Prof. B. T. Barreto of the Estacion Experimental Agronomica, Santiago de las Vegas, Cuba; No. 9016.

Type soldier.—Cat. No. 26489, U. S. N. M.

EXPLANATION OF PLATE 1.

Fig. 1. *Obtusitermes biforma* Snyder. Large soldier. Dorsal view of head.
Fig. 2. *Obtusitermes biforma* Snyder. Large soldier. Lateral view of head and pronotum.
Fig. 3. *Obtusitermes biforma* Snyder. Small soldier. Dorsal view of head.
Fig. 4. *Obtusitermes biforma* Snyder. Small soldier. Lateral view of head and pronotum.
Drawings by Miss E. T. Armstrong.

NOTE ON MATING FLIGHT OF HEXAGENIA BILINEATA SAY[1] (PLECTOPTERA).

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

On June 15, 1923, the mayfly (*Hexagenia bilineata* Say.) became abundant along the shores of the Potomac River between Georgetown and Chain Bridge, D. C. During the day they settled in large numbers on branches of trees along the river banks, but every evening shortly after dusk swarms of these winged mayflies engaged in an interesting mating flight. They left the branches of the trees and hovered over the water nearby in such large numbers as to make quite a rustling noise as they flew. This mating flight lasted about half an hour, until nearly dark. The first few nights that the flight was observed, two adults were very seldom seen flying off together; but on June 20th such pairing was much more frequent. Invariably the pairs flew off over the water, with sometimes a third adult attempting to join the pair.

Birds such as grackles, catbirds, etc., fed on these insects in great numbers during the day time.

Each evening the mating flight began with a few individuals, reached its height with maximum numbers of adults, and then gradually subsided with a decreasing number. These flights could be observed all along the river front in the vicinity of bushes or the lower branches of trees from whence they had come, and they extended throughout a period of about one week.

A similar mating flight has been noted by the writer in connection with *Tabanus americanus* Forster.

[1]Determination by Nathan Banks.

Actual date of publication, February 7, 1924.

The realization of the economic importance of entomology has led to a subtle, almost subconscious, division among the entomologists themselves, a separation into two groups; not, as some suggest, into economic and uneconomic "pure-science" entomologists (all entomology as far as it is science is at least potentially economic); but into entomological scientists and entomological hobbyists, those who pursue entomology as a serious, practical study and those who collect and hoard insects as they would Ming pottery, autographs, postage stamps and other impedimenta, simply to satisfy a certain acquisitive instinct. These latter can hardly be acknowledged as scientists. They are, however, useful citizens, and they have two very real virtues, all too rare among more serious entomologists, especially of the younger generation. They preserve specimens; and they preserve them properly. They respect the tools of the craft.

It is a notorious fact that, for all the valuable work done by economic entomologists, their contributions to the collections have been woefully inadequate. They rear insects, study life histories, note variations in behavior and tabulate all kinds of statistics; but they do not save specimens. The result: long papers full of statements that must be taken on faith. Now faith belongs properly to religion, not to science. Science demands the presentation of visible evidence to attest its findings. In entomology the best evidence is the insect itself, properly mounted and properly labeled. For every experiment there should be specimens preserved, not simply a couple of adults manhandled until their nearest relatives would fail to recognize them and which the specialist may be asked to name; but a reasonable supply of specimens, representing as many stages of the insect as possible. These should be deposited in collections where they will be cared for, available for future study, and accessible to all responsible students. At present our commonest species are poorly represented in the collections and the systematic study that must ever guide and support the economic is badly handicapped. We want specimens, and particularly we want specimens with a history. The field workers should supply them. They frequently do not. Two common excuses are offered for this failure: the worker has no time to devote to preserving specimens, or he is not able to prepare them properly—this last most frequently in the case of the smaller lepidoptera. The first of these is not true. If one can afford time for an experiment, he can afford time to carry it on carefully. The second is no excuse at all. It is a confession. It puts one in the class with the carpenter who can not drive a nail or use a saw. No entomologist is worthy of the name who can not make decent preparations—slide or otherwise—of the insects he studies. An untrained school-girl can do it with a week's practise. A scientist should be able to do as much.

C. H.

NOTES AND NEWS ITEMS.

In accordance with the suggestion of Miss C. R. Barnett, Librarian of the U. S. Department of Agriculture, I desire to place on record a note supplementary to my paper entitled: "On entomological publications of the United States Government" (Proc. Ent. Soc. Wash., v. 25, 1923, pp. 1–32), relative to the publications of the Department now on file in its library. Miss Barnett states that watchfulness for some time past "has enabled us to fill all serious gaps in our collection and to accumulate much ephemeral material which is now of historical interest only. For example, of the U. S. Division of Entomology Circulars (First series) mentioned on page 9 of your paper, the Library has 10 issues variously numbered from 1b to 43, besides 5 unnumbered issues."

—*J. S. Wade.*

The Principles of Insect Control.—Wardle, Robert A., and Buckle, Philip. Publication CLV, Biological Series 3, University of Manchester. The University Press, London, 1923, pages i–xvi and 1 to 295.

Messrs. Wardle and Buckle have given in the above-mentioned book an orderly, comprehensive treatment of the principles of insect control under four main heads. Part I deals with biological control, Part II with chemical control, Part III, mechanical control, and Part IV with legislative control. This is followed by an appendix, which deals with machinery aiding in insect control. Under the major heads, the subject is presented in a methodical manner, and where necessary, is discussed under a number of chapters. This work is the first book which deals entirely with the principles of insect control and as much very recent information is incorporated, it should serve as a very useful text and reference work.

—*S. A. Rohwer.*

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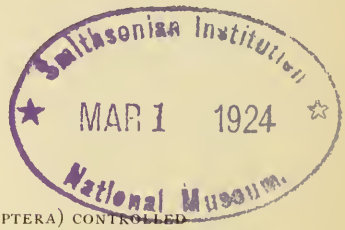
PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON



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PROCEEDINGS OF THE

ENTOMOLOGICAL SOCIETY OF WASHINGTON

VOL. 26 FEBRUARY 1924 No. 2

ADDRESS OF THE RETIRING PRESIDENT.

By L. O. Howard.

ON ENTOMOLOGICAL SOCIETIES.

The Entomological Society of Washington will be forty-one years old next month. It is the sixteenth oldest entomological society in the world of those which have been publishing continuously since their formation. Our Society has published no annals or transactions like those that dignify the records of the still active entomological societies of France and of London, but it has published a series of Proceedings which have given it a high rank in the history of biological organizations. As originally produced, these publications were really proceedings of the meetings, but of later years their character has been somewhat altered, and our publications, which are now important for the reference shelves of libraries and are there to be found around the world, are not searched with the keen interest of former years for the notes and experiences of field workers.

During these years, however, the Society has grown. Whether it has broadened or not is another question. Of course, it has broadened as entomology has broadened, chiefly perhaps through the insistent urge of the needs of economic entomology. But the Society no longer attracts to its meetings men of other specialties—general zoologists, geologists, botanists—as it did in other years. It is less a meeting place of naturalists centralizing on entomology, with a distinct social aspect, than a working body of entomologists each distinctly absorbed by some one or more phases of the general subject.

It offers a rather striking contrast to the other entomological societies both in this country and in others. I have listed thirty publishing entomological societies of continuous existence in the order of their founding:

		Approximate present number of members.
1832.	Société entomologique de France	600
1833.	Entomological Society of London	700
1839.	Breslau, Verein für schlesische Insektenkunde	80
1845.	Nederlandsche entomologische Vereeningen	170
1855.	Société entomologique de Belgique	225

1856.	Entomologischer Verein	500
1858.	Schweizerische entomologische Gesellschaft	110
1859.	Entomological Society of Philadelphia (title changed to American Entomological Society)	300
1859.	Societas entomologica rossica	
1863.	Entomological Society of Ontario	175
1869.	Societa entomologica Italiana	73
1872.	Brooklyn Entomological Society	
1874.	Cambridge Entomological Club	81
1879.	Entomologiska Forening i Stockholm	300
1880.	Deutsche entomologische Gesellschaft	
1884.	Entomological Society of Washington	206
1887.	Entomologisk Forening, Copenhagen	182
1889.	American Association of Economic Entomologists	730
1892.	New York Entomological Society	
1901.	British Columbia Entomological Society	45
1904.	Československé společnosti entomologicke (Societas entomologicae Bohemiae)	142
1905.	Allgemeine entomologische Gesellschaft	
1905.	Hawaiian Entomological Society	25
1907.	Société entomologique d'Egypte	143
1908.	Entomological Society of America	645
1913.	Deutsche Gesellschaft für angewandte Entomologie	
1914.	Societas entomologica Helsingforsiensis	
1915.	Nova Scotia Entomological Society (Acadian)	32
1916.	Florida Entomological Society (orig.)	40
1918.	Sociedad entomologica de Espana	141

One gets a fairly good idea of these societies from their publications. From printed matter, however, one can not gain really desirable information regarding the atmosphere of the meetings, and none at all of the personalities of the men who attend them. The Entomological Society of London still prints a full and fair report of the proceedings of the meetings, and therefore, for this reason as well as for the reason that we too use the English language, we feel better acquainted with that society perhaps than with many of the others. This particular society is a strong, active organization, and it is a great pleasure to attend one of its meetings. The same may be said of the Entomological Society of France, and I am sure of many others, but I greatly doubt that in any of them there is quite so general an interest on the part of members or quite so large an average attendance as at the meetings of our own Society. It seems to me too that we cover a broader field, and it is certainly true that we have a far larger body of professional entomologists among our members than has any other society. When, however, I have had occasion to attend the meetings of other socie-

ties, either in this country or in Europe, I have been extremely interested in the preponderating part taken in these organizations by amateur entomologists; and returning home I miss this element in our own meetings. In past years the bulk of the very important taxonomic work was done by men and women who might be called amateurs, and they still constitute the largest element in almost every working society except our own.

[Here the speaker described certain meetings of the Entomological Society of London and the Entomological Society of France, which he had had the good fortune to attend; also the present meeting room of the Italian Entomological Society in Genoa and that of the Entomological Society of Russia in St. Petersburg before the great war. He also mentioned briefly the local American societies whose meetings he had had the privilege of attending, notably the Cambridge Entomological Club, the American Entomological Society, the New York Entomological Society, the Brooklyn Entomological Society, the Entomological Society of Louisiana, the Jugatae at Ithaca, the old Albany Entomological Society and the old Harris Club of Boston.]

Of late, critical remarks have been made, not only about the Entomological Society of Washington, but about the other scientific societies of this city. So far as the Entomological Society is concerned, I have just indicated in a way a comparison between it and some of the large foreign societies, and I think that such a comparison is not at all unfavorable to our own society. But I realize that as an individual or an organization grows older, in the natural course of things they are apt to become reactionary and perhaps too self-satisfied. I am sure, however, that the officers of this Society, and the whole membership as well, are anxious to make our meetings more interesting and scientifically of greater importance, and I am also sure that they will welcome heartily any constructive criticism.

So much for the entomological societies. For the solider portion of my address, I wish to place before you certain things relating to the insect parasites of insects.

INSECT PARASITES OF INSECTS.

Although the idea of the practical use of the insect enemies of injurious insects is old (see Marchal's and Silvestri's historical accounts—1907), their application on a large scale under scientific auspices is distinctly modern. The very simple introduction of the Novius or Vedalia from Australia into California and its extremely rapid and very perfect success occurred only thirty-three years ago, and, while blazing the way for this kind of international work and while it apparently saved the citrus industry of California from extinction by the white scale, it

aroused by its rapid success a host of false hopes and created a school of enthusiasts in California whose misguided efforts held back the progress of economic entomology in that State for ten years or more, who wasted large sums of money in the effort to repeat the success with the aid of untrained and unscientific men, who derided the opinions of skilled students of parasitic forms, and who threatened at one time seriously to interfere with the well planned and scientific work of this general character which had been begun cooperatively by Massachusetts and the Bureau of Entomology with regard to the parasites of the gipsy moth. Incidentally, they introduced and liberated in California at least one injurious form—a secondary parasite—which recently has interfered seriously with the work of *Aphycus lounsburyi*, an effective parasite of the black scale.

Although all these secondary results of the success of Novius seem most unfortunate, they have taught the level-headed element among the agriculturists and horticulturists and they have taught the economic entomologist to go slowly in such matters and to study most carefully a large number of factors intimately concerned with the success or non-success of such international work.

I am not going into this subject historically, because I have already done so in several publications (see bibliographical list for one of them—1916), but I am going to try to point out that in work of this character there are very many things to be considered and that, like most of the problems of life, it is extremely complicated.

Among the things to be considered carefully and which will involve much study let us consider first briefly what Fiske has called the "sequence of parasites." With such sedentary and simple-living forms as the Coccidae, a single species of parasite or natural enemy may bring about control, as we have seen in the case of the fluted scale and the Novius and also with the mulberry Diaspis and the little Aphelinine, *Prospaltella berlesei*, in Italy and elsewhere; but when we come to species with life histories complicated by a distinct metamorphosis and whose natural life environment includes multiple elements and which in two of their stages move more or less rapidly, it seems that they are generally attacked by a number of different parasites, certain of which parasitize the eggs, others the different stages of larval growth and still others the pupae. Such a parasitic environment almost invariably occurs in the regions to which the host is native. When the host has become accidentally established in another country it would seem natural to suppose that it will be necessary to reproduce its whole native parasitic environment to bring about control in its new home, and that it will be only when a certain percentage of the eggs have been destroyed that the larval parasites will be able to reduce the

crop enemy to such numbers that the final pupal parasites will bring the species measurably under control. This is the gist of the sequence theory. But it is not so simple as it appears. The extraordinarily complicated question of hyperparasites comes in; and, although at first glance it would seem that it might be possible to avoid bringing in hyperparasites with the primary parasites or that it might be easy to destroy the hyperparasites or at least to prevent them from escaping, we meet the following unfortunate situation. We will shortly consider the question of specificity of parasites, but we must now anticipate by indicating that almost without exception among the parasitic Hymenoptera the hyperparasites are not specific by any means; they are, on the other hand, very catholic, and primary parasites introduced from one country to another will almost surely be attacked by hyperparasites native to the country of introduction; and this attack may often be more effective than the action of the hyperparasites in the country of origin of the primary parasites.

In his well-thought-out paper entitled "A Criticism of the Sequence Theory of Parasitic Control," Dr. W. R. Thompson (1923) concludes that the sequence theory can not be considered as a valid general theory of parasitic action since it applies simply to a very limited group of special cases, and even here he points out in a way that an interruption from some unforeseen cause of the multiplication of one single parasite in the chain blocks the operation and permits the increase of the host.

Another matter carefully to be considered is the relative rate of multiplication of the introduced parasite or predator as compared with the rate of increase of the insect to be controlled. The parasites are necessarily imported in small numbers, with the intent of overcoming perhaps billions of hosts. Figure, for example, that two thousand parasites are brought into this country to destroy say ten millions of a species of injurious insect and that the parasites multiply twice as fast as the host insect. A mathematical computation will show that, all things going well, it will take the parasites seven or eight years to catch up with the host. In this matter of multiplication we must consider, not only the number of generations annually of each species, but the number of eggs laid by the females of each generation. There are also here other facts besides the number of generations, which come in as possibly favoring rapidity of development of the parasites. The phenomenon of parthenogenesis occurs widely among the parasitic Hymenoptera, and where we have, as often occurs with this group, a whole generation composed entirely of fertile females or very largely of such individuals, the parasite has an enormous advantage, and control may more speedily be reached.

Unfortunately, however, parthenogenesis is not confined to

beneficial parasites. It reaches its highest development in the plant-lice, all of which are prejudicial to human interests. However, the extraordinary powers of multiplication given to the plant-lice by this virgin birth are measurably compensated by the extraordinary numbers of natural enemies, both parasites and predators, which destroy these insects, which are themselves so delicate, so weak, and apparently so appetizing that, with the exception of a few species more or less protected by coloration or by exudations from special glands, it is only by this rapid multiplication that they maintain their existence.

Another factor is that of polyembryony. In parasitic forms in which this extraordinary vital process occurs the parasites have an enormous advantage over their hosts. Unfortunately, so far as our present investigations have gone, polyembryonic parasites are rather rare and are not serious factors in the control of many injurious insects of first-class importance. The recent studies of Leiby and Hill (1923) have demonstrated this mode of development with an important parasite of the Hessian fly; Silvestri (1906–1921) and Patterson (1919) have shown it with certain parasites of crop-destroying Noctuid larvae, while, of course, Marchal (1904–6) originally pointed it out in the case of a parasite of a Hyponomeuta injurious to small fruits in Europe but which as yet has done little or no damage in the United States.

Then comes in the question of necessary secondary hosts. A European parasite, for example, noted for heavy parasitism of a given injurious insect, may have and often has more than one generation annually, while the host insect with which we are principally concerned has but one. In such cases it is necessary that the parasite should have one or more additional hosts with a different cyclical evolution, to carry it through the year. Should this parasite be carried to another country with a differing fauna it might very well fail entirely against the host insect for which it was imported, on account of the absence of other hosts to carry it through the year. Such parasites, of course, are by no means specific, and it often happens that in the country of introduction they accommodate themselves to other hosts native to the new country. We have seen both of these conditions in the course of our work with the parasites of the gipsy moth; and I have indicated in a paper published a year or so ago that, not only have certain of the introduced parasites been able to carry themselves through several generations upon native insects, but they have become noteworthy enemies of some of our native injurious forms. Thus, one of the Apanteles imported to destroy the gipsy moth has become an abundant parasite of the white-marked tussock moth; while one of the Tachinids, also imported to destroy both the gipsy moth and the brown-tail moth, has taken to a large number of American hosts

and has become an apparently important parasite of more than twenty species of which at least half a dozen are of very considerable economic importance.

The presence of secondary hosts, however, seems to be of importance in another way than the filling in of gaps as has been described, although investigations along this line have not been as yet carefully followed out. I tabulated, in my early paper entitled "A Study in Insect Parasitism," (1897) the periods of issuing of the sexes of *Pimpla inquisitor*, showing the point which interested me for the moment, namely, the prior issuing of the males, but these studies were made with a single host. The European observer, Schevirev, studying a congeneric parasite in Russia, announced in 1913 that he had reared females, and *females only*, from large-sized Lepidopterous larvae, and males, and *males only*, from small Lepidopterous larvae of other species. Some such vital habit as this may at any time be found and will account perhaps for failures in establishment of imported forms.

Still another factor which has already been noted in practice and which at any time may happen in future work is the interbreeding of imported forms with native forms or races of different host relations. We come here against the old questions as to what is a species, and what is a geographical race, and is there such a thing as a physiological species? For example, there is in Europe a well known parasite of the gipsy moth and other hairy Lepidopterous larvae, known as *Tachina larvarum*. We got as early as 1905 a large supply of this species from Sardinia through the kindness of Silvestri and his late colleague Leonardi, and we expected excellent results from the known efficiency of this species in Europe. But it so happens that there is an American species, *Tachina mella*, which can not be distinguished by external characters from the European form but which is parasitic upon native American caterpillars. Early observations by the Massachusetts men showed that while this American Tachina lays its eggs rather freely upon the gipsy moth larvae it can not be reared from this species, since the eggs are cast off with the skin by the caterpillar in molting before they have a chance to hatch. There can be no doubt that the introduced European form interbred with the American form and that the offspring lost the power of parasitizing the tough-skinned and bristly gipsy moth larvae.

Another instance of curious and somewhat similar nature occurred with a Tachinid which was brought over from Europe and colonized in 1907–1908 and which we have been calling *Parexorista cheloniae* but which, according to Webber, is in reality a distinct though closely allied species which he calls *Carcelia laxifrons*. It is our belief that, just as with the big European and American Tachinids to which we have just referred, the European form has interbred with a closely allied

American form, the European stock being practically absorbed. It seems that the native species can not successfully attack the brown-tail moth. But we are still breeding a few specimens, and in fact from 1911 to 1923 it has been found in small numbers annually. Webber suggests that in some individuals of the interbred form the European stock predominates, enabling them to attack the brown-tail moth. It may possibly be, however, that those recovered now are pure-bred and that for unexplained reasons the conditions over here are not favorable for their increase.

This leads us to another point, and that is that it is probable that with certain forms, although the climatic conditions in one season or another, or general conditions, may be suitable to the host insect and may favor its rapid increase, they may be distinctly unfavorable in some particular to the parasite. The possibilities in this direction are numerous but are very difficult to point out and to distinguish. We know as a simple and elementary fact, for example, that while plant-lice should breed more rapidly in sunny weather, as a matter of fact they breed more rapidly in damp, rainy weather. This does not mean that these climatic conditions favor their increase, but that they have just the opposite effect with their important parasites of the Braconid group Aphidiinae. In sunny weather the parasites increase more rapidly than the aphids; in damp, rainy weather the parasites can not fly about, and the plant-lice increase.

In fact, the more we study climatic conditions and weather changes, the more we find that they influence the increase or decrease of parasites; and further, we must acknowledge that when a host insect has increased to enormous numbers and then begins rapidly to subside we must not, even in the face of what seems to be a plain case, attribute this great decrease to the action of insect enemies only, even if these have been increasing at a more rapid rate than the hosts, since climatic factors may have been working on both hosts and parasites and since the important factors of over-crowding, starvation and disease have been working on the hosts.

It may be as well here to say something about parasites in the sense in which economic entomologists have used the name. It has been pointed out by certain students of the newly formed grouping of studies known as parasitology that a true parasite is one which lives with and upon or within its host without causing the immediate death of the latter. This is the extreme to which parasitism has reached and necessitates an immensely long association. With the true insects parasitism as thus defined exists rarely if at all. Hence, as compared with certain other organisms, it is argued that the assumption of parasitism is relatively recent with the insects. The extreme parasitologist would class what we call parasitism every day with the insects as

a modified predatory habit. Just as we find the larva of Scutellista within the body of the female black scale feeding actively upon the eggs, so we find the larva of Apanteles feeding internally but as an active predator upon the tissues of the caterpillar which it is really destroying. But the parasitologists, in broadening their view and in the effort to increase the scope and importance of their studies, are greatly broadening the use of the term and are bringing into their publications all sorts of forms which are in reality nothing but predators (for instance, see the last edition of Brumpt's "Précis de Parasitologie" or any number of the American Journal of Parasitology). There really seems no reason why entomologists should abandon their old understanding of the use of the term *parasite* as opposed to *predator*, even though there is a point where it is difficult to distinguish whether the species under consideration should be considered as belonging to the one class or to the other. It is hardly fair to say, as it has recently been put, that the entomologists consider an insect a parasite where it has a single individual host or destroys in one way or another a single individual insect, and a predator when it destroys several. We have the idea sufficiently clear in all our minds so that exact definitions perhaps are unnecessary.

What we call parasitism occurs with several orders of insects. In the Hymenoptera it predominates with a whole group of families and superfamilies. With the Diptera, we find it notably with the Tachinidae but also with eight or ten other families. With the Coleoptera, true parasitism occurs with at least three families while other families consist of noted predators. Practical experiments in international transportation have concerned themselves almost entirely with insects of these orders, although we tried a number of years ago to bring Raphidia from Australasian regions, and only recently failed in a rather large-scale experiment to introduce the very strange little Ithoniids, which Doctor Tillyard has so successfully studied, from New Zealand into the United States. It seems, by the way, rather strange that no international work has been suggested with the predatory Heteroptera. Recent developments in Porto Rico and Australia with regard to Scarabaeid larvae which damage the sugar-cane plantations have indicated the great desirability for close study of those so-called wasps of the family Scoliidae which in their larval state feed upon white grubs and may be said to afford an instance of a family rapidly verging towards parasitism. And the importance of this particular group of parasites or pseudoparasites is enormously emphasized at the present moment, when we are trying in every way possible to secure effective enemies for the Japanese beetle in this country.

As yet we have no good way of estimating the probable value

of the Scoliids or of their adaptability to international work. Wolcott, in his attempts to introduce United States forms into Porto Rico, has met with practically no success; and the only instance in which strikingly good results have been claimed has been the case of *Scolia manillae*, which the Hawaiians have brought from the Philippines into the Hawaiian Islands to destroy the earth-inhabiting larvae of a Anomala beetle which is injurious to many plants. In talking with Mr. C. P. Clausen, just returned from Japan and Korea, I asked his opinion of the value of Tiphia as an enemy of white grubs, and he told me that in a state of nature in Korea he considered that it destroyed perhaps twenty per cent of the grubs. When I asked him what enemies Tiphia had in the state of nature which might prevent its increase, he told me of a hunting wasp which stores its nests exclusively with adult Tiphias, and he also mentioned the destruction of the Tiphia larvae by the same fungous disease which destroys the grubs in the earth. He also reminded me that the literature contains references to Hymenopterous parasites, and also to the destruction of the wasp in its cocoon by Rhippiphorid beetles and by Mutillids as pointed out by F. X. Williams.

Possibly the most elaborate work with Scoliid parasites that has been done during the last few years has been by Charmoy in the Island of Mauritius, where the sugar cane is seriously attacked by Oryctes. Several species of Scoliids have been introduced from Madagascar and from the Antilles, and two or three of them have become established. It is difficult to estimate the exact amount of control which they have exercised as yet, since there is going on at the same time an expensive and extensive hand-collecting of the adult beetles, the sugar planters appropriating a sum equal to twenty-five thousand dollars each year. Very many millions of the beetles have been collected, thus rendering the work of the imported Scoliids easier. Charmoy makes the interesting point that, in order to concentrate the Scoliids at the points where they are most needed, it is desirable to establish artificial plantations of food plants of which the adults are especially fond, and considers that "It is useless to try and acclimatize Scoliids without supplying the appropriate flowers to serve as food for the adults."

With all of the parasitic insects we see varying degrees of adaptation, from a very rudimentary form down to the closest and most specific adaptation. This means to me that we can at the present day, by the study of this extreme range of variation, trace out the historical sequence of parasitism. With the species which we as economic entomologists have to consider we see very great variations in specificity of adaptation. There are certain parasites which are rigidly adapted to a single species of host, and from these we range

down to the very general parasites. All of them must be taken into consideration. With Hymenoptera, we have perhaps a greater range of variation than we have with the Diptera. If we study comparatively the host relations of the two orders we are impressed with the fact that with the Tachinids and the Dexiids each species apparently has a wide range of hosts. This must mean that parasitism with the Diptera was acquired later in the world's history than parasitism with the Hymenoptera, of which very many forms possess such specific adaptations to their hosts that their history must be a very long one.

Perhaps the most interesting feature to the biologist of the discovery of the cause of the Isle of Wight disease of the honey bees is the curious and extremely perfect adaptation of the parasitic mite to life in the tracheae of the honey bee and, presumably, of other Apoids. This indicates a very long history to this parasitism, the exact adaptation having been brought about obviously only after thousands of years.

But the Acarapis which causes the Isle of Wight disease is not an insect; and such a perfect adaptation between parasite and host occurs as yet very rarely among the true insects, although there is an article in the current number of the *Canadian Entomologist* (Oct., 1923) in which I have given an English résumé of the observations of the Frenchman Chopard concerning a European parasite of the common European Mantis, which offers an extraordinary instance of a very interesting adaptation.

Among the parasitic Hymenoptera, as we have stated, we have all degrees of adaptation: certain of them are very general parasites, attacking insects of several different orders; others (and in this we include not only species but genera and even families) have become adapted to some individual order or even families of insects; still others will parasitize generally the insects of a given group; while with still others the particular adaptation has extended so far that a single species will parasitize a single species of host and no other.

It early occurred to me in my studies that there was a very definite connection between the bodily structure of the parasitic Hymenoptera and their host relations, and I began a catalog of these host relations so far as they had been recorded anywhere in the world. It soon became obvious that while in certain groups the host relations were well fixed and apparently normal there were other groups whose parasitism was of such a general character that it seemed impossible that their diverse features should not be associated with morphological change, and I felt that from a close study of these relations we might be able to select groups for further morphological study with the probability that separating characters hitherto unused or unsuspected might be found to substantiate the correlation. As early as 1893 I published an introductory paper on "The

Correlation of Structure and Host Relation among the Encyrtinae." The paper itself was novel and sufficiently significant. It may be noted, for example, that in its analysis of the host relations of the as then constituted genus Encyrtus it was shown that there had been recorded twelve quite distinct types of hosts, eight of them occurring in Europe and all in America, and it was further pointed out that careful study would show the existence of probably as many distinct morphological genera. This in the course of years has proved to be the case, and the genera have been erected by one author or another.

It is interesting to note that fifteen years later C. T. Brues took up the same idea and prepared a paper entitled "The Correlation between Habits and Structural Characters among Parasitic Hymenoptera," following it three years later with one entitled "The Correlation of Taxonomic Affinities with Food Habits in Hymenoptera, with Special Reference to Parasitism." In this latter paper (which is not referred to in our bibliographical list, but which was published in the American Naturalist for March and April, 1921), Doctor Brues gives a very good discussion of the term *parasitism* as applied in entomology and goes rather deeply into the general subject. In his former paper he did not know of my 1893 article but followed out a number of the same ideas independently.

Reference should be made here to an important paper, entitled "Speciation and Host Relationships of Parasites," by Dr. A. C. Chandler (*Parasitology*, XV, pp. 326–339) in which parasites of vertebrates are considered and which brings out many important points. It is a very interesting essay from the neo-Lamarckian point of view.

It should be said here that there are certain elements in parasitism, which appear plainly to the careful student, which connect the parasitism not so much with the host insect as it appears in the system of classification adopted by entomologists as it does with the method of life of the host insect.

There are, for example, certain morphologically well defined groups of parasites, such as perhaps the majority of the species of the Chalcidoid families Eurytomidae and Torymidae, which are parasites of insects which live in galls, and these insects are not all necessarily of the great gall-making group, the Cynipidae, but they may be gall-making sawflies or Coleoptera or Diptera or Lepidoptera. The excitation to oviposition is not the morphological character of the host insect but the gall which it inhabits. In the same way there are parasites with which the same species lays its eggs indifferently in the cocoons of the Hymenopterous parasites of the subfamily Microgasterinae and in the silken pockets in the so-called webs of the brown-tail moth, an insect of another order. Here the excitation to egg-laying seems to

be the passing of the ovipositor through the silken cocoon or pocket.

It is fairly safe to assume that what may be termed a generalized host relation is more primitive than a highly specialized host relation, since the latter depends upon special adaptations which can only be acquired in the course of a very long time. But since we have all of these different intergradings existing between extremely generalized host relations and an absolute specificity we can not fail to conclude that we have on a large scale here species in the making under our very eyes, and, after species, genera and the higher groups. It is an interesting thought, although of course the same thing is happening all through nature; but here, it seems to me, we can get a somewhat clearer view of the process than elsewhere.

In the study of some of these forms having rather general host relations we have pointed out that there are very many forms of hyperparasites, and in the interrelations of these hyperparasites and their different hosts we find many perplexing problems for the person who is studying parasites with the idea of utilizing them. Since these secondaries attack other parasites and are in a measure indiscriminate in such attack, it often happens that a given species which is a detriment to our plans by destroying primary parasites in which we have a great practical interest may at any time become of value to us by attacking other secondary parasites.

A very interesting example of how a secondary parasite which, as such, is injurious to the interests of the crop grower, may become beneficial by becoming a tertiary parasite is shown very well in my studies of the parasites of the white-marked tussock moth (1897, U. S. Department of Agriculture, page 52), in which it is shown that *Dibrachys boucheanus* is a parasite upon *Pimpla inquisitor*, *Meteorus communis*, *Limneria valida* and *Apanteles delicatus* (all primary parasites of the tussock moth). It also destroys *Bathythrix pimplae* and *Spilochalcis debilis*, which are secondary parasites, thus in this role becoming itself beneficial to human interests.

We now come more directly to the subject of international transportation of parasites. As you will note from the bibliography, much has been written on this subject and it is very desirable that the historical accounts in particular be studied. The main questions to be considered in planning an importation have already been touched upon. It is possible that here we should say something about the phenomenon that has been termed "superparasitism" by Fiske, or "epiparisitism" by Haviland, or "accidental secondary parasitism" by Pierce. It is obvious that where we have two distinct species of parasites attacking the same host at the same time conditions are bad for the parasites, and that one of them will ordinarily succumb

in its larval life. In such cases a careful study should be made of the biology of each species in order to ascertain which of the two or more forms will prove the hardiest, will multiply the most rapidly and altogether possess the most important biological features; and then the others should be rejected in importation plans for a time at least. Such difficulties as this have occurred in actual practice in the importations of the parasites of the Mediterranean fruit fly into Hawaii. A certain species (*Opius humilis*) brought to Hawaii from South Africa is a useful species, but it suffers by competition from another Braconid which was introduced from Australia; and there is in addition still another Braconid and a Chalcidoid, all four being primary parasites of the fruit fly.

It seems obvious that the first forms for which we should search and which should be selected for importation are, if they can be found, exclusively specific parasites possessing few natural enemies of their own. I think this idea is generally admitted. The case becomes somewhat complicated when we are introducing at the same time specific internal parasites and predatory insects, since the introduced predatory species make no distinction between their prey when it is parasitized and when it is unparasitized. This was the idea which Berlese had when, after importing and establishing *Prospaltella berlesei* to kill off the mulberry scale and having made a success of this importation, he found that Silvestri, further south in Italy, was bringing in from other countries not only additional parasites of other species but predatory beetles. This was the beginning of the chasm between two former friends and coworkers and has resulted in two schools of economic entomologists in Italy, the one the Berlese school and the other the Silvestri school, between whom there has sprung up not only a great rivalry but a campaign of detraction which is very regrettable. I received, by the way, the other day from Raymond Poutiers of France a photograph of a group of delegates to an international conference on olive culture, and in the group were both Berlese and Silvestri. I hope that this may mean reconciliation.

An important thing which we must point out at this time is that we must not expect, and especially must we not predict, speedy success with introduced parasites. Speedy establishment we may hope for in many cases. Absolute control of the injurious form can be expected in the great majority of cases to come about only after the lapse of years if ever. We may, however, in many cases reasonably hope for a very considerable assistance from the introduced forms, an assistance which will help greatly with other measures towards the bringing about of measurable control.

We have already covered some of this ground, but we may point out categorically the following points which will interfere with prompt establishment, or rather, act in delaying results:

(1) The necessity for a sequence of parasites with many host insects.

(2) The necessity for a rather prolonged period of time to elapse before the parasite, introduced in comparatively small numbers and even with a greater rate of multiplication than its host, can catch up in numbers to the millions of the host insect.

(3) The probable necessity for secondary hosts in the country to which the parasites are imported.

(4) The possibility of the interbreeding of the imported forms with native forms or races, thus producing offspring which will inherit the capacities of the native species only.

(5) Climatic conditions, either general or specific to a season, which, while not unfavorable to the host, may be very unfavorable to the introductions.

(6) In the case of Scoliid wasps, the absence of flowering plants attractive to the adults.

I have emphasized these points for the reason that there is always the greatest call from agriculturists and horticulturists for speedy results. People whose property is being destroyed by hordes of insects are naturally impatient of delay. Basing their ideas on the many-times-published accounts of the success in California and elsewhere with Novius and the successes in Hawaii, many people, even including many of those of rather broad information, still expect speedy successes under all conditions, not considering in the least the points which we have just made.

In this connection there is much to be learned from a study of the work we have done with the parasites of the gipsy moth and the brown-tail moth. In fact, the laboratory at Melrose Highlands possesses a mass of notes, accumulated during the past nineteen years, which, when carefully studied, will throw much light upon many practical subjects as well as upon questions of great biological importance. Of the large number of species of parasites and predators which we have brought from all over Europe and from Japan, not more than half a dozen have succeeded definitely in becoming established and in spreading throughout the devastated area. For example, between 1906 and 1909 no less than eleven species of Tachinid parasites were imported in greater or less number and liberated for coloni-

zation in New England. Down to October, 1923, not a single individual of any of these eleven species has been recovered; but to offset this we have the extraordinary success of *Compsilura concinnata*, which has apparently received no check whatever in this country. It was liberated in 1906 and 1907 and has continued to spread and increase since that time. In the present year it is established all over New England and along the eastern border of New York State. This species, therefore, has acted just as we originally expected nearly all of them to act. It is curious to note, however, that even with this docile and valuable species our neighbors in Canada have had much more difficulty than we have had in Massachusetts. It was taken from Massachusetts and liberated in New Brunswick in 1911, but not until 1918 were Tothill and McLaine able definitely to state that the species had been established in Canada.

It becomes obvious, from the careful studies made by Webber and Schaffner of the host relations of *Compsilura concinnata* in America, that there is a hitherto unsuspected danger in the importation of such a catholic species as the Compsilura. I had been thinking of this species as one of the most valuable of our gipsy moth parasite importations, not only on account of its efficiency against the hosts for which it was imported but also on account of its adaptability to native Lepidopterous larvae of injurious habits. There is, however, an upsetting of the balance of nature in a way that was not previously considered. In its extensive parasitism of native hosts, it is antagonizing the native parasites of these hosts, either by superparasitism or by competitive parasitism. It is true that the native hosts are being killed, but it is also true that by this competition the native parasites are being reduced in numbers. This is a very curious complication. It reaches out almost indefinitely. Where the native parasites are specific, this competition may be harmful to human interests; where they are general, it necessitates a balancing of values and a consideration of the question as to whether the native parasites may attack injurious hosts which the imported parasite will not touch. Will this bring about a more specific relation of the native parasites to the hosts untouched by the imported parasites? Or will it destroy them by competition with them in the destruction of some necessary secondary hosts?

Of the hymenopterous parasites, we have established several species, but so far only two have done the work that was expected; these two, however (both species of Apanteles), have more than justified all the efforts which the government and the State of Massachusetts have made in this direction.

The same thing may be said of that extraordinary Carabid beetle known as *Calosoma sycophanta* which we first imported in 1906. Down to 1911, after careful rearing in confinement, we

had been able to liberate about eighteen thousand, adults and larvae. Since then the spread has been extraordinary. The beetle and its larvae feed not only on the gipsy moth but on many of our other native caterpillars, and it is interesting to note that the species has spread far beyond the limits of spread of the gipsy moth. When the big colony of the gipsy moth was discovered in New Jersey on the Duke Place, the Calosoma had arrived there—how, no one knows—and was at work apparently before the gipsy moth itself had been identified by the State or government entomologists.

Some of the other species imported have been apparently lost, but have suddenly come to the front after a lapse of years and have multiplied in numbers.

Quite recently, and in another field, there have been two instances of delayed establishment which have greatly encouraged us. I refer to the recovery of *Scutellista cyanea* in Louisiana the past year and of *Pleurotropis epigonus* in Maryland, Pennsylvania and surrounding States during the past few years. The Scutellista was sent me by Berlese from Italy in 1898 and was put out by Prof. H. A. Morgan at Baton Rouge that same year. It was never recovered in Louisiana until last year, when it was found parasitizing the black scale in New Orleans. It is perfectly true that in the meantime the same species had been brought from South Africa to California and there established as an enemy of the black scale on citrus trees and on the pepper tree; and it is quite possible that both the scale and its contained parasite had been brought into Louisiana from California. But there remains in my mind a strong probability that it became established shortly after 1898, and that the reason possibly that it was not discovered was that it transferred its principal attention to another of its European hosts, namely the black scale, whereas we were searching for it on the wax scale (Ceroplastes) on which it was originally liberated.

The *Pleurotropis epigonus*, the parasite of the Hessian fly, was sent over to Professor Riley by Frederick Enock in 1890, and was liberated first by Webster at La Fayette, Indiana, by Forbes at Champaign, Ill., and by Cook at the Agricultural College, Michigan. In 1894 another small sending was received from Enock, and the parasites were released at Cecilton, Md., and Fredericktown, Md. Only a single specimen was found in 1895, and from that time on until 1917—twenty-two years—it was not recovered. Then it was turned up at Fredericktown, Md., by Mr. P. R. Myers of the Bureau of Entomology. The species has now become one of the common parasites of the Hessian fly throughout Maryland, Pennsylvania, New Jersey and New York.

Here we have a delayed recovery of twenty-five years in the one case and twenty-two years in the other. I deem it quite

possible that perhaps a number of the parasites which we have brought over in former years for the gipsy moth, and for the recovery of which we have given up hope, may still be found and may still give us effective service.

Mr. Burgess attended the seventy-fifth anniversary meeting of the Entomological Society of Ontario a few weeks ago and read a very careful paper under the title "The Value of Insect Enemies of Injurious Insects," which will undoubtedly be published in full very soon in the Annual Report of the Entomological Society of Ontario. He includes in this paper a most interesting table showing parasites imported and the num bers in which thev were liberated. From this table it appears that 73,643,341 individual parasites have been put out. This is a startling number, but it should be stated that all except about a million were of the two species of egg-parasites, namely *Anastatus bifasciatus* from Europe and Japan, fifty-three millions and a little over, and *Schedius kuvanae*, twenty millions and a little over.

The last published historical account of the parasite importation work was the one which I prepared for the Yearbook of this Department for 1916. Since that time much work of interest and importance has been going on in different parts of the world. As to our own part in America, we began once more in 1920 the work with parasites of the gipsy moth and the brown-tail moth which had been interrupted by the outbreak of the World War in 1914. At that time our Mr. Summers was caught in Germany, and got back to this country with much difficulty. Since the resumption, Mr. Crossman and Mr. Webber have made two rather extended stays in parts of Europe, and Mr. Summers has twice visited Japan. It has been our desire to reproduce in this country the parasite environment of both gipsy moth and brown-tail moth both of Europe and of Japan. As I have pointed out, in the work before the war comparatively few of the parasites were established so far as we have as yet been able to ascertain. We wish to reintroduce the species which apparently failed to become established, and we wish also to complete the series.

The problem of the Japanese beetle has become so acute and has proved itself so difficult of solution that we are coming more and more to believe in the great importance of parasite introduction. Consequently Mr. Clausen has been in Japan and Korea for the past four years; Mr. King has been helping him; Mr. Fullaway and Mr. Illingworth have been added to the force, and work in China and India is contemplated; and in addition to all this a Russian entomologist, Mr. A. Znamensky, has been appointed, on the recommendation of Doctor Borodin, to take up work on the parasites of *Anisoplia austriaca*, a species allied to the Japanese beetle and which occasionally occurs in injurious numbers in southwest Russia.

It is hoped that the man who will be sent to India during the next season will take up again the effort to import from that country to this the little Mymarid parasite found by Mr. Woglum some years ago, which I described as *Prospaltella lahorensis*, but which failed of establishment in Florida.

Mr. Smyth has just returned from his second visit to Mexico, where he has been studying the native parasites of the Mexican bean beetle. He has found one Tachinid which is important in Mexico and which we hope to establish in the United States.

An effort on a somewhat larger scale is being made with the parasites of the European corn borer. After two years' preliminary work in Europe, principally at Auch (Gers), France, Dr. W. R. Thompson has established for the Bureau at Hyères a well equipped laboratory where at present he has two well trained assistants. They have been successful in their studies and have sent large quantities of parasitic material to this country.

For more than a year Mr. T. R. Chamberlin of the alfalfa weevil force has made his headquarters at this Hyères laboratory and has carried on a most careful study of the biology of a number of the European parasites of the alfalfa weevil. It is my earnest hope that this laboratory may be continued for a number of years at least, and that we may center there all of our studies of the native parasites of all of the injurious species common to the United States and southern Europe.

These are the highlights of the North American aspects of the work; but in the meantime we have been able to assist other countries. The little Aphelinine parasite of the woolly root-louse of the apple (*Aphelinus mali*), native apparently to the United States, has been established in France, South Africa, New Zealand and Uruguay, and promises to be of very considerable assistance to apple growers. This, briefly stated, brings us down to date. There are many other attempts being made in one way or another in different countries, but results so far do not justify extended notice. The striking successes down to the present time have been with *Novius cardinalis* in many countries, with several species of parasites in Hawaii, with *Prospaltella berlesei* in Italy and also in Argentina, with several of the gipsy moth parasites and the Calosoma beetle in this country.

As may possibly be gathered from this paper, much as has been done, the work is still in its infancy. It is a promising field and this factor will possibly prove itself to be one of the principal factors in the ultimate control of many of our most important insect enemies. So great are the possibilities that I look forward to the formation of a distinct section or division of the Bureau which will concern itself with these general problems. The section should include systematists like Rohwer, Cushman,

Gahan, Muesebeck, Myers, Aldrich, Webber and Greene, biologists like Thompson, Leiby, Hill and Timberlake, explorers and field men like Clausen, King, Fullaway, Smyth, Summers, Crossman and Muir, and as many others as may be required.

It should be the ultimate aim of such branch of the service to establish in America as many as possible of the parasites and predatory species of *certain* value from all foreign countries. To secure funds for such an effort will be difficult, but I do not despair of ultimate success.

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LEMA TRILINEATA OLIV. (COLEOP.) CONTROLLED BY AN EGG PARASITE.

By F. H. Chittenden, *U. S. Bureau of Entomology.*

While searching for the larva of *Lema trilineata* Ol. on *Datura stramonium* during the early autumn of 1915, the writer was surprised in finding none, although eggs and beetles were abundant. Eggs collected from time to time for rearing the larvae failed to hatch and then it was noticed that all eggs were dead. Finally the egg parasite, a very minute chalcidoid, was detected. It was determined by Mr. A. A. Girault as belonging to the eulophid genus *Emersonella*, and at the writer's suggestion, was named *lemae* and described the following year.[1]

As early as 1838 Harris[2] recorded attack by *L. trilineata* on potato, calling the insect the "three-lined potato beetle," and stating that its numbers were sometimes immense and that potato leaves were covered and nearly consumed by the filthy larvae.

The species develops normally on *Datura* and feeds freely

[1]Societas Entomologica, Vol. 31, July 21, 1916, p. 36.

[2]Economic Geology of Mass., by Edward Hitchcock, 1838, pp. 76, 77.

on certain other *Solanaceae*, such as *Solanum* and *Physalis*. For many years it has been injurious in the vicinity of the District of Columbia to belladonna, henbane (*Hyoscyamus*), and other medicinal plants and less troublesome on potato.

The abundance of this egg parasite clearly indicates the reason why the three-lined potato beetle is not more destructive, in this vicinity at least. As a result of the activity of the egg parasite, injury was much less severe in 1921 than in earlier years in localities where formerly it was reported on potato on numerous occasions. In 1921, aside from one small planting of belladonna, on which the insects occurred in numbers early in the season, the species was actually scarce and larvae were not seen during the heat of summer or later, all eggs being parasitized. For the first time in many years several experimental plats, including large plantings of Jamestown weed, grew to full maturity with scarcely any noticeable injury by this insect.

In 1922 the Lemas became very abundant early in the season and continued so until overcome by the egg parasite which destroyed them completely, as usual. In 1923, however, the beetles, as a result of this complete parasitism, were extremely rare until about the first day of July, when they were first seen. They did not become at all numerous until later in the season and then they were overwhelmingly outnumbered by the parasites. This shows the rise and fall in development of *Lema trilineata* in comparison with its hosts, paralleled in the case of other insects, as, for example, the Vedalia, now known as *Rodolia* [*Novius*] *cardinalis* Muls., an insect which practically keeps under complete control the fluted scale of California. As an example of other insects which seem to lead a similar precarious existence in recent years when compared with their natural enemies, may be mentioned the common cabbage worm (*Pontia rapae* L.), the tomato worms (*Phlegethontius* spp.), and in some regions, the Colorado potato beetle.

By July 19 egg masses were noticed that were parasitized by *Emersonella lemae*. From then on as in previous years all eggs were thus affected. September 5 a female was noticed laying an egg mass, which was carefully watched by Mrs. D. H. Blake to ascertain how soon the eggs would attract the Emersonella and a few minutes after beginning observations she called the writer's attention to the fact that an egg destroyer had appeared on the mass before all of the eggs were laid. In about an hour, six more parasites were at work on the same mass, showing the extreme activity of this parasitic species.

Before the discovery of this egg parasite, the natural conclusion reached by the writer as to the reasons why *Lema trilineata* was not a potato pest of importance was that it was being literally crowded out by *Leptinotarsa 10-lineata* Say and that it also perished when arsenicals were used against this more

important pest. In the light of our present knowledge, it is evident that the causes for its inactivity as a potato pest are three-fold: (1) Disturbance due to the far more aggressive Colorado potato beetle, driving it to other Solanaceae for food; (2) The use of arsenicals for the control of the Colorado beetle and (3) The activity of the egg parasite *Emersonella lemae*.

ANOTHER SEED-CHALCID ATTACKING THE CULTIVATED GRAPE.

By A. B. Gahan.

Mr. R. A. Cushman recently called to my attention a series of specimens of an Eurytomid taken by him at Vienna, Virginia, June 19, 1913, ovipositing in cultivated grapes which were approximately half grown. The grapes were not infested by any insect which might have served as host for a parasite and Mr. Cushman informs me there could be no doubt that the Eurytomids were ovipositing in the seeds and that he had assumed that they were probably *Evoxysoma vitis* (Saunders), the only recorded grape seed chalcid.

Comparison of the specimens with the types of *E. vitis* showed at once that a quite different species was involved. I have determined it as the *Prodecatoma phytophaga* originally described by C. R. Crosby as a seed chalcid infesting seeds of *Parthenocissus quinquefolia* (Virginia creeper) in New York (Can. Ent., vol. 49, 1909, p. 50). The record is interesting and important as indicating the probable occurrence in this country of two seed chalcids attacking the grape and also as apparently demonstrating that this species, at least, is not confined to a single host plant. The record needs to be verified, however, by actually rearing the species from grape seeds.

Actual date of publication, February 27, 1924.

In the human economy anything accumulated over and above what can be used—regardless of its intrinsic value—is so much rubbish. This is as true in science as in society, of facts as of furniture. Everything should find its place and function in a coordinating, unifying system. If it does not, either the accumulation is unnecessary or the system is inadequate. The only other possible alternative is, that both are partially true. In our science of entomology this last is the case. Let us consider a few facts.

Literature is piling up. Species are being created by thousands. Names are being made even faster; and the nomenclature is becoming so involved that it is as often a hindrance as a help. New lines of investigation are opening up in every direction. Specialization is proceeding apace and there is correspondingly finer and finer subdivision of labor. But in our intensive application to special problems we are wasting and duplicating energy by losing touch with our fellow-workers. No need to go into details or cite examples. They are obvious and familiar to us all. In this fecund anarchy the systematists who should be unifying and synthesizing the various elements, are making the confusion worse confounded by their stubborn attention to detail and sublime indifference to a central purpose. Rightly they should lead the scientific advance, indicating the lines of investigation to biologist, morphologist and field investigator. Failing this they should at least follow closely behind, gathering up the various lines and weaving them into some comprehensive and practical system. They do neither. Why?

It seems pertinent to suggest that this is as good a time as any—in another generation it will be vastly more difficult—to reduce the chaos to some kind of order, to make a general inventory, assemble the essential facts, discard the rubbish and begin something in the nature of an *Encyclopaedia Insectorum* which shall be, to present day entomology, what Linnaeus' *Systema Naturae* was to pioneer zoology. This sounds like an impossible or, at least, impractical task. But is it? For one, or two or any half dozen of us—yes. For the entomological specialists of the world—no. It would be no bigger an undertaking than the *Encyclopaedia Britannica*. The vision before us and the cooperation of the various specialists are all that is really needed. Not much to ask when you consider what a close corporation we are. And money? Of course; but money should be comparatively easy to get. Anything big enough to grip the imagination needs not long go a-begging in this country.

In the meantime we can help toward the desired end by making more large-scale revisions and monographic studies. And we can indulge the larger dream. If we do not we shall have to face the nightmare. And that is not a pleasant thing to contemplate. —*C. H.*

North American Cerambycid Larvae.—Craighead, F. C., Dominion of Canada Dept. of Agric., Bul. No. 27, New Series (Technical), pp. 1–239, figs. 1–8, plates I–XLIV. Ottawa, 1923. Price, $1.00.

The above-mentioned bulletin is a scientific contribution of very great value; and places its author definitely among the leading entomologists of the present day. Much honor is due to the Canadian Department of Agriculture for having published the book and presented it in such beautiful shape.

The bulletin gives tables, descriptions and figures for identification and treats the biological features necessary for recognition in the field. The usefulness of these data is easily recognized when we find that about 300 species are treated and among them all the economic ones.

It is, however, not the practical value of the work which makes it an outstanding contribution, but the strictly scientific methods applied in the treatment of the different subjects.

The classification of the larvae is first discussed in a comprehensive way and correlated with that of the adults. The author corroborates Schiödte's conclusion that both stages when thoroughly studied and interpreted fit into the same systematic arrangement.

In the following chapter the biological characteristics of the larvae are correlated with their anatomical structure and their bearing on the taxonomy is discussed. The presence of parallel body modifications to similar environmental conditions, discussed some years ago by Hopkins, is borne out by Craighead's observations and supported by many striking examples.

The anatomical characterization of the family is given in a most thorough and comprehensive way. It is a chapter of great value both for young and advanced students of the anatomy of insect larvae in general as well as of Cerambycid larvae in particular. It is worth mentioning that the author has avoided the copious use of new anatomical terms; he is in this respect very conservative, and his presentation therefore is easily understood by all familiar with the terminology of the old classical authors.

From page 26 to page 150 are found the keys to the subfamilies, tribes, genera and species, the descriptions, the biological observations and the many taxonomic discussions.

A criticism may be entered here. The spelling of too many of the systematic names is careless. Poor proof-reading is partly responsible, but many misspellings were evidently present in the original manuscript. It is irritating to find these spots in the otherwise so blameless work.

This book will be known and used all over the world; it will grow in esteem the more it is used; it will influence and help the study of entomology a long step forward.

—*Adam Böving.*

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PROCEEDINGS OF THE

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A NEW GENUS AND SPECIES OF APHIDS. (HOMOPTERA.)

By P. W. Mason, *U. S. Bureau of Entomology.*

While examining a collection of aphids in connection with a study of the genus *Amphorophora*, a certain species was observed to belong to a new genus. This species was sent by Dr. Edith M. Patch who had given it the manuscript name of *Amphorophora kalmiae*. It is described at her suggestion. It runs in Baker's generic classification to *Microparsus* Patch, from which it can be separated by its swollen cornicles and by the presence of media in the hind wings.

NEOAMPHOROPHORA, new genus.

Head with distinct, diverging, non-imbricated antennal tubercles. Antennae of six segments, armed with subcircular sensoria. Fore wings with the media once branched; hind wings with cubitus absent. Cornicles swollen. Cauda long, slightly constricted.

Type.—*Neoamphorophora kalmiae* Mason.

Neoamphorophora kalmiae, new species.

Alate.—(Plate 2, figs. A–E). Right antenna slightly shorter than body, dark colored, imbricated, hairs very small and inconspicuous, segment III with 26 sensoria, over entire length, not in a straight row, segment IV with 9 sensoria, over the entire length, not in a straight row, segment V without secondary sensoria. Antennal measurements as follows: III 0.400 mm.; IV 0.248 mm.; V 0.240 mm.; VI 0.168+0.320 mm. Left antenna missing. Antennal tubercles shorter than width of segment III. Vertex prominently developed. Beak reaching second coxae. Prothorax without tubercles showing. Veins of wings with a slight brownish tinge. Right cornicle missing. Left cornicle conspicuously swollen, tip imbricated, not reticulated, 0.352 mm. long; widest diameter 0.08 mm.; smallest diameter 0.032 mm.; flange 0.040 mm. Cauda 0.224 mm. long, narrow, slightly constricted, with two sets of lateral hairs.

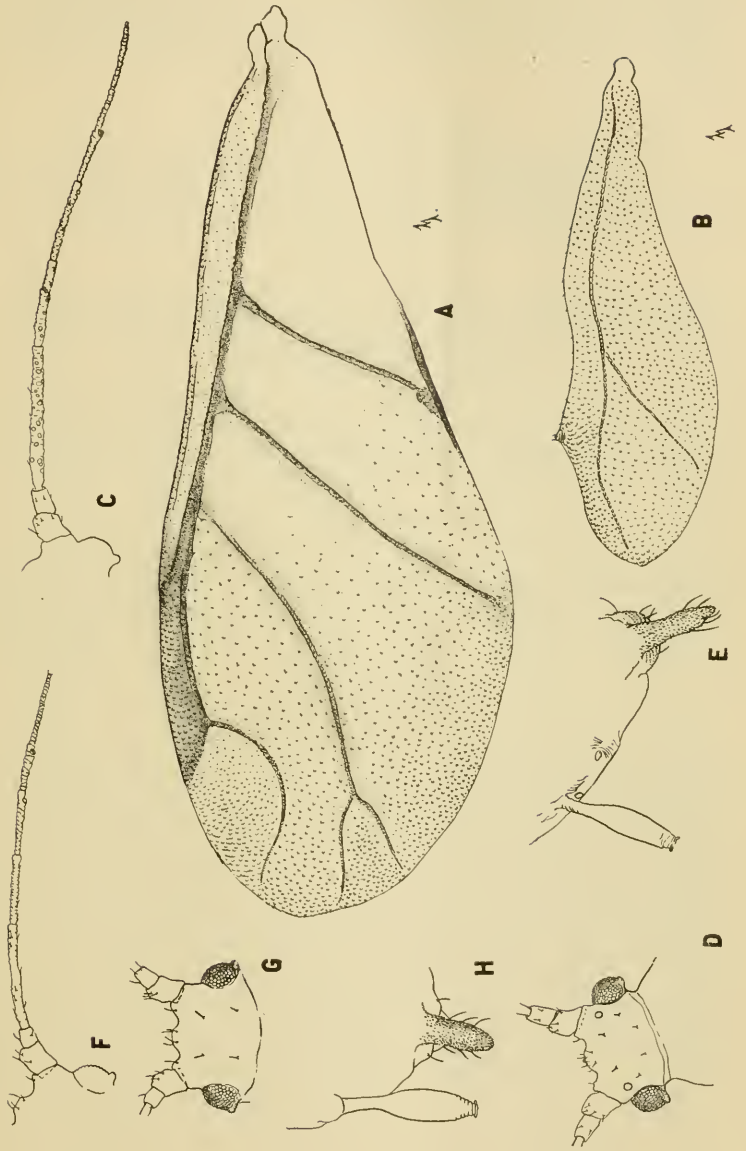
Apterous viviparous female.—(Plate 2, figs. F–H). Antennae shorter than body, faintly inbricated, light colored, segment VI somewhat darker, hairs inconspicuous, shorter than width of segment, no secondary sensoria present, segment I somewhat protruding on inner side. Antennal tubercles about as long as width of segment II of antennae. Vertex prominently developed. Beak reaching somewhat beyond second coxae. Abdomen with large dark, dorsal patch. Cornicles of moderate length, heavily and rather suddenly

swollen, the tip darker, imbricated but not reticulated, a distinct flange present. Cauda long and slender, slightly constricted, two sets of lateral hairs. Measurements as follows:

No.		*III*	*IV*	*V*	*VI*
1	Left	0.304	0.192	0.192	0.120 + 0.216
	Right	0.304	0.192	0.192	0.112 + 0.224
2	Left	0.224	0.144	0.144	0.096 + 0.192
	Right	0.208	0.144	0.128	0.096 + 0.192
3	Left	0.192	0.128	0.144	0.096 + 0.208
	Right	0.192	0.120	0.144	0.096 + 0.192
4	Left	0.248	0.184	0.160	0.096 + 0.224
	Right	0.264	0.168	0.168	0.112 + 0.224
5	Left	0.280	0.176	0.176	0.104 + 0.224
	Right	0.272	0.184	0.160	0.104 + 0.224
6	Left	0.304	0.208	0.208	0.128 + 0.224
	Right	0.312	0.224	0.192	0.120 + 0.232
7	Left	0.176	0.128	0.128	0.096 + 0.192
	Right	0.192	0.120	0.112	0.096 + 0.192

				Cornicle			
No.		*Head*	*Cauda*	*Length*	*Widest diameter*	*Smallest diameter*	*Flange*
1	Left	0.432	0.224	0.400	0.112	0.032	0.048
	Right			0.416	0.112	0.032	0.048
2	Left	0.368	0.224	0.368	0.104	0.024	0.032
	Right			?	?	?	?
3	Left	0.344	0.192	?	?	?	?
	Right			0.352	0.080	0.032	0.040
4	Left	0.368	0.216	0.432	0.136	0.024	0.032
	Right			?	?	?	?
5	Left	?	0.224	0.400	0.120	0.032	0.040
	Right			?	?	?	?
6	Left	0.424	0.272	0.432	0.128	0.032	0.048
	Right			0.416	0.128	0.032	0.040
7	Left	0.336	0.208	0.336	0.088	0.024	0.040
	Right			0.336	0.088	0.024	0.032

Described from one alate and several apterous viviparous females taken by Miss Patch at Orono, Maine, on *Kalmia augustifolia* (Maine numbers, 68–18, 100–18, 105–18, 216–18, 284–18, 343–18). The alate was taken on June 18 (mixed collection). The other collections were June 25 (apterous viviparous females with young, June 28 (apterous viviparous females and young, some with wing-pads), July 23 (apterous viviparous females), August 5 (apterous viviparous females and nymphs). Miss Patch writes that they were apparently common in 1918 on the under side of the leaves. She sends the following color notes of the apterous form, "general body color yellow, large dark


A
B
C
D
E
F
G
H

brown patch on dorsum of abdomen. Collar with dusky transverse mark. Cornicle pale or brown. Nymph pale yellow."

Type.—Deposited in the U. S. National Museum, No. 26381. Cotypes returned to the Maine Agricultural Experiment Station.

Explanation of Plate 2.

Figs. A–E—*Neoamphorophora kalmiae* Mason. (Alate.) A—Forewing. B—Hindwing. C—Antenna. D—Head. E—Cornicle and cauda.

Figs. F–H—*Neoamphorophora kalmiae* Mason. (Apterous female.) F—Antenna. G—Head. H—Cornicle and cauda.

A NEW SPECIES OF CANACEA FROM THE UNITED STATES (DIPTERA: EPHYDRIDAE).

By J. R. Malloch.

The genus *Canacea* is distinguished from other Ephydridae by the presence of a complete anal cell in the wing. There is no species of the genus definitely listed from North America.

Canacea macateei, new species.

Male and female.—Black, densely pale gray pruinescent. Frons when seen from behind lead colored, the triangle slightly shining; occiput paler gray; face and cheeks white; antennae and arista black; palpi yellow. Dorsum of thorax with a brownish tinge down center. Abdomen greenish gray, hypopygium of male brownish. Legs black, gray pruinescent, tarsi yellow, apical segment partly grayish. Wings grayish hyaline, veins fuscous. Halteres whitish.

Frons three-fifths of the head width; each orbit with about four long fine bristles curving outward over eye; triangle extending to anterior margin of frons, the margins with several long setulae on the entire length; ocellar and postocellar bristles as long as the interfrontals; frons protuberant in profile; cheek at genal bristle about one-third as high as greatest height of eye, the lower margin with about three bristles, a strong upwardly curved one near vibrissa about as long as the genal bristle; arista pubescent, about as long as antenna. Thorax with four pairs of dorsocentrals between which there are four irregular series of short hairs, the median two series the longest; prescutellar pair of acrostichals distinct; scutellum with four marginal bristles, two shorter bristles and some fine hairs on disc; mesopleura and sternopleura with short sparse hairs, the former with two or three long posterior bristles, the latter with one long bristle. Abdomen with six or seven distinct tergites, the second not distinctly differentiated from the rudimentary first, and distinctly longer than any of the others; hypopygium of male with the claspers subtriangular, genitalia on female with a pair of long chitinised hooks. Fore femur in both sexes with three or more short stout bristles on apical half or more of anteroventral surface. Inner cross-vein a little beyond basal third of discal cell; outer cross-vein at less than its own length from apex of fifth vein.

Length, 3–3.5 mm.

Type.—In U. S. National Museum (Cat. No. 26883).

Type, male, allotype, and a large series of paratypes of both sexes, Jekyl Is., Georgia, June 23, 1923 (W. L. McAtee). Named in honor of the collector.

A NEW GENUS AND SPECIES OF THE NOTOPTEROUS FAMILY GRYLLOBLATTIDAE FROM JAPAN.

By A. N. Caudell and J. L. King, *U. S. Bureau of Entomology*.

INTRODUCTION.

During the summer of 1922, while in Seoul, Korea, the junior author had the pleasure of meeting the Honorable Edme Gallois, French Consul General for Korea. Monsieur Gallois has long been an enthusiastic entomological collector in Japan. During the course of a conversation M. Gallois spoke of an interesting insect he had taken in Japan and which he was unable to place as to family, however, he considered it an Orthopteron. From M. Gallois' verbal description the writer immediately placed the insect in question as possibly a species of Walker's genus *Grylloblatta* or a type closely allied to it. Subsequently on seeing the specimens, one male and one female, this conjecture was confirmed. Through the information thus gained it was possible later to secure specimens and with the kind consent of M. Gallois the following new genus and species are here described.

DESCRIPTIONS.

GALLOISIA, new genus.

Differing conspicuously from the nearctic genus *Grylloblatta* Walker in the rather remarkable tarsi, which in this new genus have the segments broad and furnished with a pair of articulated apical flanges on each segment except the fifth where there is a similar one but apparently not doubled; these projections are probably homologous with the tarsal pads, usually known as pulvilli, of many insects. Their appearance is shown by the accompanying illustrations, pl. I, figures 2 and 3, and they are described somewhat more in detail in the description of the species.[1] In *Grylloblatta* the tarsal segments are simple and without pulvilli, as shown by figures 4 and 5. Other characters of probable generic value, but less striking than the tarsal structure, are found in the cerci, which are nine segmented and much longer in proportion than the eight segmented ones of *Gryloblatta*, and the antennal segments, the third of which is about three times as long as the preceding one while in the nearctic genus that segment is scarcely longer than the second. Male only studied.

Type of genus.—Galloisia nipponensis, new species.

[1]Similar articulated appendages are found in certain other insects, as *Camptonotus carolinensis* Gerst. of the Orthopterous family Gryllacrinae.

Galloisia nipponensis, new species.

Description of adult male (from a dried specimen).—Head somewhat blattoid in form, moderately flattened and attached obliquely to the thorax; epicranial sutures distinct. Eyes very small, not very clearly defined, scarcely as large as the basal segment of the antenna, irregularly elongate in form and consisting of about 50 or 60 distinct fascetts, the whole very abortive in appearance. Ocelli absent. Maxillary palpi with five segments; basal segment subquadrate, 2d slightly elongate, 3d about as long as 1 and 2 together and moderately clavate, 4 and 5 subequal in length, each slightly shorter than 3 but similar in shape, the 5th more narrowly rounded apically, but less swollen. Labial palpi with three segments, the segments subequal in length, each about three times as long as broad and shaped about as in the last three segments of the maxillary palpi, but not quite so large. Clypeus subquadrate, but little broader than long, the cephalic half mesially membranous. Labium semicircular, the cephalic margin rounded. Antennae broken off, one at the 10th and one at the 14th segment, but each probably consisting of 40 segments, the number found in nymphs; the basal segment is moderately flattened, strongly so basally, and nearly twice as long as thick when viewed from the narrowest aspect, the broadest view making it subquadrate, the whole much larger than any of the other segments; second segment cylindrical and subquadrate; 3d segment cylindrical and elongate, being about three times as long as broad and about three times as long as the second; fourth and several following segments subquadrate or but little longer than broad, those towards the apex, judging from the antennae of nymphs, growing more slender and elongate.

Thorax very moderately convex dorsally; sternal plates small and well separated; pronotum slightly longer than broad, gently narrowed from in front backwards, the lateral margins very slightly rounded, the disk gently convex, the anterior margin very broadly rounded, the hind margin more narrowly rounded; near the anterior margin of the pronotum is a sinuate transverse sulcus; mesonotum about as long as the posterior width, anteriorly much narrower than posteriorly, the posterior width about equaling that of the posterior width of the pronotum; lateral margins nearly straight, the posterior margin gently concave; metanotum similar to the mesonotum in shape but slightly shorter.

Abdomen rather heavy, elongate, broadest mesially and with ten dorsal sclerites each with a few stout spinules situated near the sides; the tergites do not overlap the sternites, being separated by a pleural membrane; terminal dorsal segment descending laterally to embrace the cerci at their bases, apically acute triangular, the apex prolonged into a decurved subcylindrical, bluntly pointed projection twice as long as its basal width. In the nearctic *campodeiformis* this segment is apically rounded triangular, without any decurved prolongation. Pl. 3, fig. 1, shows this character of the species now being described. Coxities present as flattened plates the tip of each bearing a style; the left coxite is subtriangular and basally extending across barely more than half the width of the abdomen; the right coxite is elongate-triangular basally, decidedly more elongate than the left one, and apically narrowed into a cylindrical neck to which is attached the style; basally the right coxite is a little more than half as broad as the corresponding portion of the left coxite, and is without a chitinous process as described in Walker's *Grylloblatta campodeiformis*. Styles

simple, cylindrical, about five times as long as broad and apically bluntly pointed and bearing several slender spines noticeably longer than the width of the style. Cerci each with nine segments, the basal two being very closely united; the entire cercus is slightly more than twice as long as the posterior tibia; the basal segment is but slightly longer than broad, basally much swollen; 2d segment about twice as long as broad, and, like the rest, cylindrical; the other segments gradually growing longer and more slender, the terminal being about ten to twelve times as long as broad; there is an irregular ring of about three to six stout setiform spinules on each segment beyond the basal except the last where there is a single ventro-apical one, though broken off of the specimen here described, the socket only remaining; these spinules are somewhat longer than the cercal width at point of attachment, some of them about twice as long; the basal segment bears a single sub-dorsal spine, shorter than the others.

Legs stout, with rather heavy brownish yellow armature, the femora and middle and hind tibia armed dorsally with spines scarcely less stout than the ventral ones, the anterior tibia however furnished dorsally with hairs only, or with fine setae. Coxae large and armed beneath and laterally with numbers of fine spinules; anterior coxa longer than the others, being about two and one-half times as long as broad and about one-fourth shorter than the pronotum, the ventral margin is straight, the dorsal one convexly rounded, the widest point at the basal third; intermediate coxae a third shorter than the anterior ones and truncate-conical in shape; posterior coxae very like middle ones but a little longer. Trochanters oblong rounded cup-like plates, the anterior ones apically subtruncate, the others apically rounded, each about twice longer than broad and the middle and hind ones with two or three very short fine spinules near the apex. Anterior femora about three times as long as wide, mesially decidedly broadened; armed beneath on the inner margin with about a dozen short and rather stout spines and above with about as many moderately slender setae arranged in two longitudinal rows. Intermediate femora a little shorter than the anterior ones and scarcely as broad; armed beneath with seven or eight stout spines on each margin and above with nearly a score similar spines roughly arranged in four longitudinal rows of three or four each except the intero-dorsal row where there are seven; most of these dorsal and lateral spines are fully as stout as the ventral ones. Posterior femora very like the intermediate ones and similarly armed.

Anterior tibia somewhat shorter than the corresponding femur, unarmed above but armed beneath with four or five rather stout spines on each margin and with two ventro-apical spurs, the inner one the longer, being as long as the basal tarsal segment, and the outer one situated almost on the median line of the tibia. Middle tibia slightly longer than the fore ones, the ventro-apical spurs subequal in length and the outer one not set in towards the median line; the dorsal surface armed with spines scarcely smaller than the ventral ones. Hind tibia similar to the intermediate ones but a little longer.

Tarsi differing conspicuously from those of the known material of the nearctic *campodeiformis* in which species the tarsal segments of all recorded specimens are simple, cylindrical and without pulvilli, while in the species now being characterized they are laterally expanded and the basal four are each furnished with a pair of partly membranous, laterally haired, lobe-like articulated ap-

pendages; the fifth segment bears a somewhat similar lobe, but apparently single and more membranous, which is situated about the middle of the ventral surface; the accompanying figures, pl. 3, figs. 2 and 3 of the right posterior tarsus of this insect, with a drawing of the corresponding tarsus of *campodeiformis*, pl. 3, figs. 4 and 5, for comparison, show the characters better than any description. The membranous portions of these pads shrivel to insignificance when dried, that of the fifth segment becoming practically invisible, but the chitinous parts, especially of those of the basal four segments, remain evident, though shrunken and more or less curled. The basal segment of the posterior tarsus is sub-cylindrical and broadening from the base outwardly, being about three times as long as the apical width, armed with three ventral spines on the inner side and four on the opposite side; on the inner side there is also an apico-lateral spine and the right tarsus has also an apico-lateral spine on the inner side but this is absent from the left tarsus, the absence of a socket indicating it was never present; second and third segments slightly more flattened and decidedly shorter, being less than twice as long as the apical width and basally narrowing into a cylindrical neck as shown in the figures; the second segment is armed with four apical spines, two ventral and two lateral, and the third with but two ventral spines; fourth segment similar to the preceding two but still shorter, being no longer than broad and without spines, only heavily haired as are all the segments; fifth segment much narrower than the others, much depressed and elongate, being about two and one-half times as long as broad. Intermediate and anterior tarsi similar to the posterior ones as described above except the segments are shorter, the basal segment of the middle foot being about twice as long as the apical width and that of the fore foot still shorter, and the basal segment of the anterior tarsus of both legs being without an apico-lateral spine on the outer side.

The claws are about three-fourths as long as the terminal tarsal segment, rather slender and with a microscopic triangular basal tooth.

This insect seems less campodeiform than shown by Walker's figures of the nearctic species, but in general appearance in life it is probably very similar. The general color is yellowish. The decidedly stouter spines of the entire insect, especially the legs, the structure of the antennae and of the last dorsal segment of the abdomen, and especially the tarsal formation should enable even the tyro to separate with assurance this Old World form from its New World relative.

Length, entire insect to tip of abdomen, about 21 mm.; pronotum, 4 mm.; fore femora, 3.9 mm.; fore tibia, 3 mm.; posterior tibia, 4 mm.; posterior femora, 4 mm.; cercus, 9 mm.; width, head, 4 mm.; pronotum, anteriorly, 3.5 mm.; mesonotum posteriorly, 3 mm.

One adult male, the holotype, taken at Chuzenji, Near Nikko, Japan, by J. L. King on September 15, 1922.

Type.—In collection, U. S. N. M., Catalogue no. 26848.

Nymph.—Besides the type there are two male nymphs evidently belonging here, taken by Mr. King and also deposited in the collection of the U. S. National Museum. These are more nearly like the described specimens of *campodeiformis*, the tarsal segments being cylindrical and without the remarkable ap-

pendages of the adult form of the present species, being similar to those of *campodeiformis* here figured; the eyes are black and more compact than in the adult; antenna about 7 mm. long and consisting of 40 segments, the third less elongate than in the adult, being less than twice as long as broad, and those immediately following are broadly transverse, those towards the apex becoming more elongate, those beyond about the middle of the antennae being subequal in length, each about three or four times as long as wide, the terminal one more narrowly rounded apically than the others. The basal two or three segments of the cerci are so closely united as to be distinguished with much difficulty, a rather careful examination failing to show with any clearness more than 8 segments, though there are really 9, the basal one being fused with the second and without spines, the rest armed as in the adult but the spines more slender. Coxities more nearly equal in size and more similar in shape than those of the adult and the terminal dorsal segment of the abdomen is apically rounded-triangular. The larger of these nymphs, marked paratype A, was taken at the same place and date as the type; the other, paratype B, was taken at the type locality on May 11, 1923.

REMARKS

Collecting dates.—Gallois' specimens were taken at Chuzenji, near Nikko, Japan. His collection dates are as follows: One adult male August 26, 1915, one adult female and a small nymph September 27, 1916. The Junior writer made two special trips to this same locality, one on Sept. 15, 1922, and secured one mature male and one nymph; the second trip occurred on May 11, 1923, which resulted in the capture of two additional nymphs.

Type locality and Habitat.—The type locality of this interesting insect is set in one of the most delightful mountain regions of Japan. The entire region is of volcanic origin and forms what is known as the Nikko Mountains. Chuzenji is a small settlement at the eastern end of the beautiful crater lake Chuzenji which has an elevation of some 4,460 feet. All specimens herein mentioned were taken on slope of Nantai San, a mountain which rises as a distinct peak from the eastern lake border, thus making the actual altitude where specimens were taken between 4,500 to 4,600 feet.

The forest in this particular region is old and little disturbed and at this altitude is quite similar to our northern American deciduous forests. The dominant species of trees occur in the following genera, *Fagus*, *Quercus*, *Acer*, *Cornus*, *Tillaea* and *Alnus* with a sprinkling of *Betula* and *Abies*. The lower vegetation, or ground covering plants consist largely of a dense growth of broad leafed bamboo about two feet in height, however such plants as *Aconitum impatiens* and several species allied to our *Cimicifuga* and *Podophyllum* manage to grow where conditions are unfavorable for the dominant bamboos.

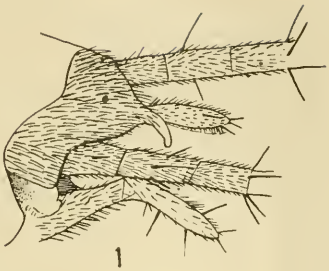
Habits.—The three immature specimens taken by King occurred under decaying logs in small natural cavities, no

distinct or special runways being observed. The only mature specimen taken was a male. This was found well within the heart of a great log which had been previously perforated by other insects.

Although at the time of collecting the weather was cold and the ground frosty, the insects were active. Their movements are rapid and may be compared to the cockroaches for agility. In captivity they are most active at night.

The two immature specimens collected May 11th, 1923, were kept alive for about one month in glass jars containing decaying wood and leaf mold. During this time they were taken from Japan to Korea with the hope that they could be reared to maturity. Attempts were made to feed them on numerous food stuffs such as fungi, tender plant tissues living and dead, starches, meats and small soft bodied insects both dead and alive; however, all seemed to fail and the specimens became less active and shrunken, finally one escaped and it was deemed wise to preserve the remaining one before it too was lost or injured.

Relationship.—The rather extraordinary tarsal structure of the adult of the above described species, considered in connection with the other less striking characters mentioned in the foregoing article, fully warrants the consideration of this genus as distinct from *Grylloblatta*. Indeed were it not for the fact that the value of a given character in the taxonomics of one group can not be taken as a criterion for judging the value of the same character in another group one might be justified in considering this tarsal formation as of even more importance than that herein assigned it. If this character existed in the nymphs as well as in the adult the present writers would consider it as of family or subfamily importance. Several detailed studies of the anatomy and phylogeny of *Grylloblatta campodeiformis* have been published by Drs. E. M. Walker and G. C. Crampton, neither of whom seem to have doubted the maturity of some of the material discussed. But studies made in writing the present paper has caused the senior author to rather seriously doubt if the real adult of the nearctic form is yet known, as in such case one would expect the tarsi to conform somewhat in structure to that of its palearctic relative. If it eventually results that the material of *campodeiformis* described as adult is actually fully matured and has tarsi similar to those of *Galloisia* as herein described and figured, this new genus will lose its most important diagnostic character. In such case, however, the other characters mentioned in the above description, together with additional ones which will very likely result from comparative studies of true adult material of both genera, will probably prove fully sufficient for the separation of this Old World genus from the New World *Grylloblatta*.



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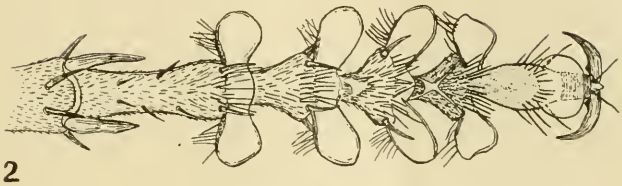
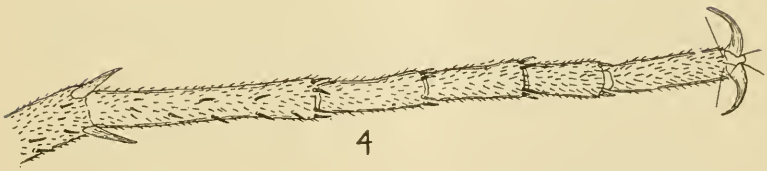


2

3 Galloisia nipponensis n. sp.



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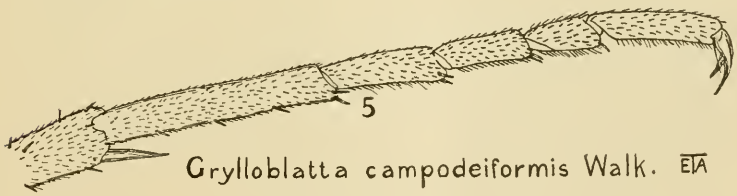

5

Grylloblatta campodeiformis Walk. ETA

Walker[1] erected the Family Grylloblattidae for his genus *Grylloblatta*, considering it as belonging to the Order Orthoptera. The following year Brues & Melander[2] raised this group to ordinal rank, calling it Grylloblattoidea. Later in the same year[3] Dr. Crampton arrived at the same conclusion, but erected for it the new name Notoptera. In papers of later date Walker and Tillyard have followed Brues and Melander in their use of the ordinal name Grylloblattoidea. A continuance of this usage is scarcely to be recommended as the termination "oidea" is, or at least should be, used for the ending of superfamily names. Notoptera is therefore decidedly preferable and should be used as priority in ordinal names is not obligatory under prevailing codes of nomenclature.

The wide distribution of the Notoptera as indicated by the above Japanese record strongly substantiates the idea of the antiquity of the order. This record adds to the group its second genus and the first record of its occurrence outside of the North American Continent.

Explanation of Plate 3.

Fig. 1. *Galloisia nipponensis* new species. Adult male. Dorso-lateral view of end of abdomen.

Fig. 2. *Galloisia nipponensis* new species. Adult male. Ventral view of right hind tarsus.

Fig. 3. *Galloisia nipponensis* new species. Adult male. Lateral view of right hind tarsus.

Fig. 4. *Grylloblatta campodeiformis* Walker. Male nymph. Ventral view of right hind tarsus.

Fig. 5. *Grylloblatta campodeiformis* Walker. Male nymph. Lateral view of right hind tarsus.

NEW SPECIES OF MYTHICOMYIA AND ITS RELATIONSHIP, WITH A NEW GENUS (DIPTERA).

By Charles T. Greene, *U. S. Bureau of Entomology*.

The new genus described below is so closely related to the genus Mythicomyia that I think it would be almost impossible to separate the two in the immature stages. Therefore I think the pupal characters below would hold just as well for the genus Mythicomyia. As this latter genus has always been in an unsettled state in regard to its location, I am giving my opinion on the location from the adult characters plus those of the pupa.

[1]1914, March. Can. Ent. vol. xlvi, pp. 93–99, pl. vi.

[2]1915, March. Keys to the families of North American Insects, pp. 1, 10, 13, pl. ii, fig. 19.

[3]1915, October. Ent. News, vol. xxvi, pp. 346, 347.

From the material before me it appears that the genus Mythicomyia, having a distinct discal cell and slender antennae, occurs only in the southwest; while the closely related genus Pachyneres, which has the discal cell confluent with the second basal cell, and the short thick antennae, occurs in the east and extreme northwest.

The genus Mythicomyia has been placed in three different families by various authors. These authors seem to think that this genus should be located directly after the genus Hilarimorpha. At first Williston[1] states that "Osten Sacken and Schiner locate the latter genus in the Leptidae. If that view is accepted, Mythicomyia should probably follow it." Williston[2] later figured Mythicomyia under the families Bombyliidae and Leptidae. It appears that he left it to some future worker to say in just which family the genus should be placed. Melander[3] placed the genus in the Empididae. Coquillett[4] also placed the genus in the Empididae. Cresson[5] places this genus in the Empididae, stating that he thinks "Coquillett was correct" in placing it here. Aldrich and Kertesz place both genera in the Leptidae.

From the characters of the pupa the genus should be placed more properly in the Bombyliidae than in the other families. All of the pupae of the Bombyliidae which I have studied have two, sharp, chitinous projections at the apex of the abdomen and numerous long, brownish-yellow hairs on the abdomen. Fig. 3. These hairs appear bristle-like but are not quite so stiff as the regular bristles of the Diptera.

In the Empididae the bristly hairs are not so prominent. The abdomen generally terminates into two, round, conical tubercles with a bristly hair at the apex of each. These tubercles are of the same texture as that of the abdomen of the pupa. The pupa of some of the Empididae do not have these tubercles, being simply rounded at the apex.

Mythicomyia californica new species.

This species runs to *Mythicomyia rileyi* in Cresson's table[6] of females.

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[1]Williston, S. W., Manual of North American Diptera, 2d Edition, 1896, p. 73.

[2]Williston, S. W., Manual of North American Diptera, 3d Edition, 1908, p. 218.

[3]Melander, A. L., Transactions American Entomological Society, vol. 28, 1902, p. 336.

[4]Coquillett, D. W., Entomological News, vol. 4, 1894, p. 209.

[5]Cresson, E. T., Jr., Entomological News, vol. 26, 1915, p. 448.

[6]Cresson, E. T., Jr., Entomological News, vol. 26, 1915, p. 451.

Female.—Black and yellow species. Vertex and occiput black, shining. Front, face and oral margin lemon-yellow, subshining. Antennae dull black, third joint wider at base, about two and one-half times longer than width at base; style about half as long as third antennal joint. Thorax subshining on dorsum, black with two very narrow, pale yellow lines, broader at each end; humeri, pleurae, scutellum and halteres pale yellow. Abdomen pale yellow with a lateral and mid-dorsal row of dull black, triangular spots. Legs pale yellow, with the tips of the tibiae, apical third of the metatarsi and the four succeeding joints brownish-black. Wings with second longitudinal vein sinuous; anal cell closed in the border of the wing.

Length, 1.5 mm.

Described from one specimen taken at Mt. Lowe, California, July 3, 1917, J. M. Aldrich, collector.

Type.—Cat. No. 26539, U. S. N. M.

Mythicomyia minutum, new species.

Runs to *Mythicomyia pictipes* in the table of females.

Female.—Black and yellow species. Vertex, occiput, front and face dull black. Antennae black; third joint one and one-half times longer than wide; style nearly as long as third joint, with the apex pointed and oblique on one side. Thorax dull black on dorsum with a broad central stripe reaching to the neck; humeri pale yellow; this yellow extends to the suture; postalar callosity and a small area in front along the pleural-suture is pale yellow but this yellow does not reach forward to the suture. Scutellum brown; black in the central basal area. Halteres lemon-yellow, basal part of stems with brownish infuscation. Abdomen nearly as wide as long, first three segments and basal half of fourth segment brownish-black, remaining apical portion of abdomen pale yellow. Femora mostly brownish-black; coxae with brownish infuscation; trochanters, apices of femora, entire tibiae and metatarsi pale yellow; four remaining joints of all tarsi brownish-black. Wings with second longitudinal vein slightly sinuous and oblique; anal cell wide open.

Length, 1.5 mm.

Described from one specimen, Las Cruces, New Mexico, June 14, 1917, J. M. Aldrich, collector.

Type.—Cat. No. 26540, U. S. N. M.

PACHYNERES, new genus.

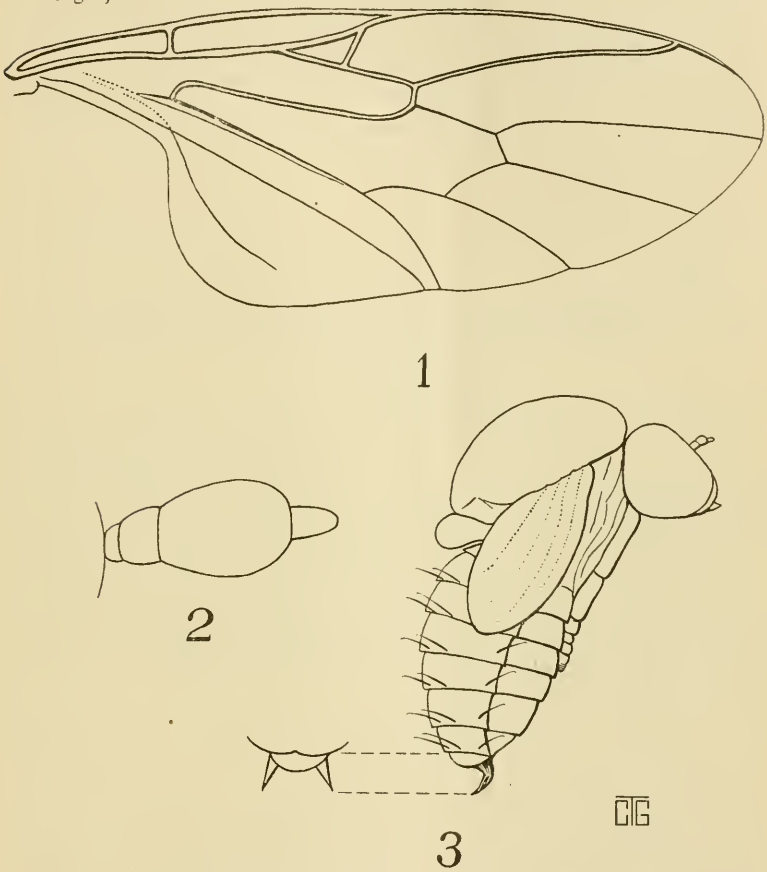
Resembles *Mythicomyia* but differs mainly in having the discal and second basal cell confluent; second vein short and straight. Antennae short and very broad; third joint only slightly longer than wide; style thimble-shaped, length about one and one-half times the diameter.

Pachyneres crassicornis, new species.

Female.—Shining black species with short black pubescence. Knobs of halteres, humeri, postalar callosities, a narrow dorso-pleural line pale lemon-yellow. Under surface of the knobs of the halteres and stems brownish-black. For further details of antennae see drawing (Fig. 2). Abdomen about one and one-half times as long as wide. The costal vein to a little beyond the tip of the

third, the first, second and third longitudinal veins entirely and the fourth vein to and including the small cross-vein, are quite heavy and dark brown in color; the other veins are thin and very pale yellow in color; anal cell wide open (Fig. 1).

Length, 2 mm.



1. Wing of *Pachyneres crassicornis* Greene. 2. Antenna. 3. Pupa, lateral view.

Type locality.—Washington, District of Columbia.

Collected in decaying tree of *Quercus velutina* in the grounds of the Soldiers Home, April 15, 1923, and reared by Miss E. E. Myers. Adult emerged April 20, 1923. Two females from Aweme, Manitoba, June 2, 1918, N. Criddle, Collector, labeled "Collected on strawberry blossoms." One specimen from Castle Rock, Pa., May 26, 1923, E. T. Cresson, Jr., collector. (Returned to the Academy of Natural Sciences, Philadelphia.)

Type.—Cat. No. 26538, U. S. N. M.

Pupa.—Pale yellow. Head distinct; antennal capsules prominent, with two distinct joints and a thimble-like projection at the apex; tip of proboscis projecting slightly. Thorax broad and humped prominently; wing pads distinct; scutellum distinct; leg capsules showing two long joints and four tarsal joints, the tip being annulated. Abdomen showing eight segments, the first and last rather small; segments two to seven showing two longitudinal double rows of brownish, bristle-like hairs slightly bent at their apex; segments four to seven each have a single bristle-like hair near the outer apical corner. At the apex of the abdomen, towards the ventral surface, are two prominent, brown, chitinous prongs or hooks, widely separated, turned upwards. For details see drawing (Fig. 3).

Length, 2 mm.

One specimen found in frass in a decaying tree of *Quercus velutina*.

A NEW GENUS AND SPECIES OF TRYPETIDAE INFESTING ASPARAGUS IN SOUTH AFRICA. (DIPTERA).

By D. W. Coquillett.

ZACERATA, new genus.

Distinguished by the unusually long antennae, which are almost twice as long as the face, slender and linear, the first joint wider than long, the second slightly longer than the third, arista bare, basal. Head about twice as high as long, face convex, slightly projecting forward at the oral margin, eyes oblong, about five times as high as width of cheek, three pairs of orbital bristles, the lowest pair on a line with insertion of antennae. Wings rather narrow, stigmal cell unusually short, second vein very sinuous, the third less so, discal cell greatly narrowed on its basal half, small crossvein at a point near two-thirds the length of the discal cell, lower apical angle of the anal cell rectangular, first vein and base of the third bristly, last sections of third and fourth veins subparallel.

Type.—The following species:

Zacerata asparagi, new species.

Black, the second antennal joint, arista and tarsi, yellow. Face polished, the sides thinly gray pruinose, front subopaque, seven spots in two transverse rows near the middle and a row of five along each eye, gray pruinose. Body somewhat polished, mesonotum marked with many gray pruinose lines, pleura thinly gray pruinose, the mesopleura covered with black dots except on its front edge, scutellum not distinctly swollen, bearing four bristles, abdomen thickly covered with black dots; ovipositor flattened, the basal joint nearly as long as the last two abdominal segments. Wings hyaline, the base to tip of first vein and from costa to fourth vein brown, basal half of second basal cell and whole of anal, brown; a large brown, three-pronged spot on outer half of wing, extending along the costa from slightly before the small crossvein to beyond apex of the fourth vein, sending a brown branch over the hind crossvein and another over the small crossvein crossing the discal cell and almost reaching the middle of the third posterior cell; the two brown regions are narrowly connected along the fourth vein.

Length 3.5 to 5 mm.

Two males and four females.

Explanatory Note.

The foregoing paper was drawn up by Mr. Coquillett in 1909, two years before his death, and sent to Cape Town, but was laid away unpublished under the impression that Mr. Coquillett intended to publish it in the United States. After some years I found the named specimens in the U. S. National Museum collection, but could not find where the description had been published. Inasmuch as the only labels on the specimens read "Worcester, C. G. H., Jan. 08." I formed the theory that the late C. Gordon Hewitt had bred the material. Writing to his successor, Mr. Gibson, in Ottawa, it was found that no record of the matter exists there. I then sent two specimens to Mr. J. E. Collin, the well-known dipterist of Newmarket, England. He replied that the species is certainly not British, and suggested that the initials on the label might mean "Cape of Good Hope." A few months later Mr. C. P. Lounsbury, of Pretoria, visited Washington, and I asked him if he remembered the species. He did, and on his return in passing through Cape Town looked it up and sent back the above manuscript.

Mr. Lounsbury writes, "The asparagus roots from which the plants were grown were imported, but it seems to me likely that the fly itself is South African."

Of the six original specimens, the type male and allotype female (U. S. N. M. No. 26695) are in the National Museum; one male and female, paratypes, were sent to Mr. Collin; and two female paratypes are returned to Mr. Lounsbury for deposit in the proper museum in South Africa.

Mr. Collin sent his specimens to Professor Mario Bezzi, of Turin, Italy, who reported that he had not seen the species among the large collections of African Trypetidae that he has worked up. Mr. Collin has kindly turned over the following additional descriptive notes on the characters, which cover details used in recent work on the family.—*J. M. Aldrich.*

Notes by J. E. Collin.

Chaetotaxy. *Head.*—Three pairs of widely-spaced incurved lower orbital bristles; two pairs of recurved upper orbitals, the front pair almost in line with front ocellars and slightly stronger than hind pair. Outer vertical bristle placed just behind upper corner of eye, some little distance from inner vertical, which is one-fifth of width of frons from corner of eye. Ocellar bristles about as long as front upper orbital; postvertical pair close together, short, upcurved and parallel. Bristles of occipital row black, very small and inconspicuous. No strong genal bristle.

Thorax.—Apparently only one pair of dorsocentral bristles (about in transverse line with front postalar bristle); prescutellars present, nearly as large as dorsocentrals. A humeral, a presutural, 2 notopleural, a supra-alar, 2 postalar, and 4 scutellar bristles. Disc of scutellum with a few short hairs. Scapular

bristles short, only one pair, wide apart. Prothoracic sternum with pale marginal hairs, and sclerite in front of prothoracic stigma with a row of whitish hairs in front. No true prothoracic bristle. Mesopleura with numerous short, dark bristles, longer and stronger on hind margin, especially towards upper corner. Pteropleura with a strong bristle on upper margin and 5–6 small bristles below it. One strong posterior sternopleural bristle.

Wing.—Subcostal vein bristly on upper surface from humeral crossvein to tip; cubital vein the same from radio-cubital node to about half way to crossvein, with an additional isolated bristle just above the crossvein. No bristles on under side of veins.

Color, etc.—The ground color of frons and cheeks is a light mahogany, but the face, jowls, and occiput are darker. The 5–6 grey spots on frons "along each eye" are fairly conspicuous, but Coquillett's "two transverse rows of spots" are really represented by an upper row of four irregular grey spots or patches—one just in front of each front upper orbital bristle and one on each side of front ocellus—and a lower row nearer front of frons of three more or less confluent spots which may also be connected on a narrow median line with the middle ones of upper row. Further there are three small grey patches on vertical ridge.

The manner in which the thorax and abdomen are reticulated or mottled with dusted grey reminds one of similar markings in *Platystoma seminationis*.

NEW TARSONEMID MITES (ORDER ACARINA, FAMILY TARSONEMIDAE).

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

In the following paper a new genus and three new species of Tarsenemid mites are described. The new genus, *Locustacarus*, is created for the reception of a new species taken from the tracheae of certain grasshoppers in the State of Kansas several years ago, and studied by Dr. P. S. Welch and L. P. Wehrle. The results of these studies were presented in a joint paper by these two authors at the 1923 meeting of the Entomological Society of America.

Tarsonemus phyllophorus, new species.

Female.—Very long, with subcircular capitulum. Pseudostigmatic organs capitate, head spherical and in diameter equal to the length of the thread-like pedicel; pseudostigmata circular, equal to heads of pseudostigmatic organs in dimaeter. Slightly above and behind each pseudostigmata is situated a long seta which exceeds in length the width of the cephalothorax.

Abdomen truncate in front and broadly rounded behind, with sides which are almost parallel. Dorsally the abdomen is divided into three subequal areas in front of the insertion of the third legs by two transverse sutures, and behind the third legs into three very unequal areas by two transverse sutures. Dorsally, abdomen nude except for a pair of minute setae situated sublaterally about midway between the second and third pairs of legs. Three pairs of minute setae around the curve of the posterior margin.

Legs rather short; first pair reaching slightly beyond the tip of capitulum; second pair slightly shorter than the first; third pair extending for a little over

half their length beyond the margin of the body; fourth pair slightly shorter than the third. Dorsal terminal seta of tarsus IV flagelliform, equal to the leg in length; ventral terminal seta of tarsus IV straight, rigid, spine-like, half as long again as the tarsus.

Length, 0.20 mm.; width, 0.08 mm.

Male.—Shorter than the female but much broader. Capitulum circular, about one-half as long as the cephalothorax.

Cephalothorax fully as broad as long; above with two pairs of conspicuous setae, the front pair is almost twice as long as the more rigid posterior pair, and is fully equal to the cephalothorax in length.

Abdomen as broad as long and broadest at the region of the third pair of legs; genital papilla considerably broader than the capitulum and with posterior part expanded and bearing a pair of setae.

Legs stout; first pair slightly surpassing the tip of papilla; second pair slightly larger than the first; third pair much the largest and longest of all; last pair reduced. The third pair of legs is dorsolateral in position; coxa about twice as long as broad; femur constricted near the base; patella not as broad as femur, about one and a half times as long as broad; tibia slightly longer than patella; tarsus about as long as tibia, very broad at its base. Femur IV about two-thirds as long as leg IV, on its outer margin, incurved, and on its inner side expanded into a large hyaline leaf-like structure. This expansion of femur IV is oval in shape, broadly rounded throughout, is a third longer than broad, one and a half times as broad as the femur is at its base, and bears above a seta near its base distally which extends fully half way to free edge of the expansion. Patella IV minute, over twice as broad as long and shorter than tibia IV. Tarsus IV reduced to a small chitinous knob.

Length, 0.19 mm.; width, 0.13 mm.

Type locality.—Florida.

Type.—Cat. No. 23777, U. S. N. M.

Described from numerous specimens of both sexes taken from *Phyllostachys bambusoides*, Brooksville, Florida, by H. L. Sanford and from many specimens from same host and place taken by W. B. Wood. Specimens also taken from *Phyllostachys* sp., Yokohama, Japan, November 27, 1922. This species is related to *Tarsonemus spirifex* Marshall, but is easily distinguished from *spirifex* in the characters of the posterior legs of the male. In *spirifex* the base of the femur is about as broad as the leaf-like expansion while in *phyllophorus* it is but little over half as wide; in *spirifex* the part of the femur extending beyond the leaf-like expansion constitutes about half the length of the segment, in *phyllophorus* it constitutes about a fifth of the segment. Also the leaf-like expansion in the two species is shaped differently.

LOCUSTACARUS, new genus.

Three pairs of functional legs present in both sexes. Female without pseudostigmatic organs. Palpi reduced, almost rudimentary. Chelicerae needle-like, curved spirally at base. Tarsi, each with a stout pair of claws and a large,

pedicellate pulvillus. Oviparous; adults hatching directly from eggs. Gravid females greatly enlarged.

This genus is related to *Eutarsopolipus* Berlese, the type species of which was taken at the bases of the wings of a beetle. It differs from Berlese's genus in that the female is provided with a dorsal plate to abdomen and the male is without the posterior forceps-like appendages (legs?).

Locustacarus trachealis, new species.

Female.—When nongravid, minute, with a broad, short body; when gravid, body distended at its middle until several times its former size. Capitulum as broad as long and about two-thirds as long as cephalothorax. Chelicerae when thrust out seem to be about as long as cephalothorax. Palpi greatly reduced, fused with beak and each terminated by two spine-like tubercles.

Cephalothorax as broad as long and provided above with three pairs of large setae; one pair situated laterally at the base of capitulum, one pair situated above the bases of first legs and one pair situated above the bases of second legs. Sternum formed by the junction of first and second epimera and extending backward along the median line to about the middle of the body in non-gravid specimens and ending in a transverse bar, or T.

Abdomen somewhat larger than cephalothorax and with almost straight posteriorly converging sides. On the abdomen above there is situated at the shoulders a pair of setae which reach scarcely half way to the posterior margin of the body; at each side, somewhat in front of the posterior corner of abdomen, is a long seta, equal to the total length of abdomen; at the tip of abdomen are two enormous setae, situated approximate and usually adhering for their whole length, which are longer than the body of the mite itself.

Legs stout, particularly the first pair. Tarsus of leg I one and a half times as long as broad; tibia broader than long; patella exceedingly short, disc-like femur much the stoutest segment. Last pair of legs more slender than the others and decidedly posterior in position; each tarsus with a long tactile seta.

Length when nongravid, 0.168 mm.; width 0.095 mm.

Male.—Similar to the nongravid female, but body more rounded and lacking the enormous setae at the tip. Posterior setae of cepthalothorax stouter than in female and situated dorsally. Legs somewhat more slender than those of female, particularly those of the third pair. Penis dorsal, extending as a spear-like shaft of chitin from about the middle of the back to the tip of capitulum. It is very suggestive of the penis of *Psorergates*.

Length, 0.133 mm.; width, 0.099 mm.

Type locality.—Kansas.

Type.—Cat. No. 23773, U. S. N. M.

An abundance of material (hundreds of individuals) received from Dr. P. S. Welch, of the University of Michigan. This material consists chiefly of females in various states of engorgement, and eggs, but also of several nongravid females and males. It was taken from the tracheae of grasshoppers. Descriptions based chiefly on specimens mounted on type slide.

Tetrapolipus rhynchophori, new species.

Gravid female.—Abdomen enormously swollen making the gravid individual easily visible to the unaided eye. Capitulum about one-half as broad as cephalothorax and slightly longer than broad. Palpi greatly reduced and fused with beak for most of their length, showing no segmentation. Chelicerae rather short, slightly curved needles, almost straight at their bases.

Cephalothorax about as broad as long, narrowed in front where it joins the capitulum; above and posteriorly the cephalothorax bears a broad shield with a broadly and evenly rounded posterior border. No dorsal setae observed on cephalothorax.

Abdomen in gravid specimens pear-shaped with the greatest diameter near its junction with the cephalothorax. Usually only a single fully developed egg present. Dorsally a transverse groove is present slightly behind the middle of abdomen; posterior margin notched at the median line.

Legs short, cone-shaped, almost twice as long as broad at their bases; four evident segments; first segment much the longest, and about as long as the other three put together; second and third segments equal in length; last segment very small. Tarsus I with a single claw; tarsus II with two claws.

Length, 0.435 mm.; width 0.348 mm.

Male.—Short, broad. Capitulum very distinct from cephalothorax, subcircular. Palpi fused with beak, greatly reduced and showing no segmentation.

Cephalothorax as broad as long and about equal in size to the abdomen. Above only a single pair of dorsal setae present which is situated dorso-laterally near the posterior angles. These setae slightly surpass the cephalothorax in length.

Abdomen as broad as long and indistinctly segmented near the tip. It is without setae dorsally. Penis long, spear-shaped, arising dorsally near the front margin of abdomen and extending forward in a median groove to the apex of capitulum.

Legs about equal. Femur much the largest segment; patella broader than long; tibia longer than patella and as long as broad and in each case bearing a long tactile seta; tarsus somewhat hooked and ending in one or two spurs, each bearing a pair of claws and a large pulvillus.

Length, 0.172 mm.; width, 0.105 mm.

Type locality.—Panama.

Type.—Cat. No. 23774, U. S. N. M.

Description based on a single male and several females, taken from underneath the elytra of a palm weevil, *Rhynchophorus palmarum*, collected at Cocoplum Bocas del Toro, Panama, February 9, 1922, by J. R. Johnston. This weevil was sent to Dr. E. A. Schwarz for determination along with several other species of Coleoptera taken from palms, and H. S. Barber called my attention to the infesting mites. Most of the mites were attached to the dorsal body wall of the abdomen. Several nymphs and many eggs were present. This species is similar to *T. batocerae* Berlese, taken from a Javan longicorn beetle, but has a much shorter cephalothorax and much smaller legs than the Old World species.

NOTES ON THE GENUS BUPRESTIS WITH DESCRIPTION OF ONE NEW SPECIES. (COLEOPTERA, BUPRESTIDAE.)

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

Casey "Studies in the American Buprestidae"[1] and Nicolay and Weiss "A Review of the Genus Buprestis in North America"[2] give keys for the identification of the adults of the species of this genus which are not altogether reliable. Casey, starting at page 89 and following through to page 105 and page 108, gives *rufipes* Fab. and *gibbsi* Lec. as having males with the anterior tibiae unmodified. As a matter of fact the males of both species have a strong reflexed subapical internal tibial spine. Nicolay and Weiss on pages 81 and 82 give *fasciata* Fab. and *langi* Mann. as having males with the anterior tibiae armed with a reflexed tooth at the apex. All of the males of *langi* examined by the writer have the tibiae unarmed. As *langi* is considered to be a variety of *fasciata* the supposition is that the tibiae of the males of *fasciata* also are unarmed.

On June 13, 1923, near Stirling City, Calif., the writer and Mr. R. D. Hartman took a number of larvae, pupae and recently transformed adults of *langi* from the outer heartwood of an old weather beaten log of douglas fir (*Pseudotsuga taxifolia*). This confirms the observation made on the host of this species by E. C. Van Dyke. Typical six spotted males were taken along with the green females. The habit of pupating and transforming in the spring indicates that *langi* belongs to the true *Buprestis* where it is placed in the keys by most authors. The absence of the tibial spines on the males would separate it from that group, however. The larva, too, is not typical *Buprestis*. It closely resembles the larva of *aurulenta* Linn. which belongs to Casey's subgenus *Cypriacis*.

Casey[1] (pp. 89–111) places *connexa* Horn in the group having males with anterior tibiae unarmed while Nicolay & Weiss[2] (pp. 81, 82) place it in the group having males with the anterior tibiae armed with a reflexed tooth at the apex. Neither specifically mention having studied any males. The writer has studied the majority of the specimens collected to date and all are females. The two specimens before Horn when he described the species also are noted as being females. Has any one a male of this species?

Buprestis fremontiae, new species.

Adult Holotype, Female.—Medium sized, length 16 mm., width 6 mm., elongate oval, widest about distal third of elytra; head and thorax brownish bronze, elytra fulvous, each elytron marked near the outer margin about the middle with a

[1]Proc. Wash. Acad. Sci., v. XI, Apr. 28, 1909.

[2]Jour. N. Y. Ent. Soc., v. XXVI, June, 1918.

medium sized subtrapezoidal purple spot, margins of tips rufous; body beneath brownish or purplish bronze, clothed with medium white hair, moderately, evenly punctate.

Head marked by a short frontal ridge, numerous punctures and calli; labrum yellowish; eyes elongate oval, brownish with yellow flecks; antennae bronzy, reaching to middle of thorax, first joint long and clavate, 2d short and clavate, 3–11 joints flattened and triangular.

Prothorax, length 3½ mm., width 5 mm., widest about middle, marked by a broad, shallow median groove, numerous punctures and calli, a small yellowish spot on each side in the anterior margin near the outer angle; sides arcuate; anterior margin sinuate, smooth; posterior margin sinuate, rather obscure; prosternum convex, moderately obtuse, smooth posteriorly, punctate anteriorly, clothed with white hairs; scutellum distinct, coppery.

Elytra slightly wider and three and one-half times as long as the prothorax; humeri moderately prominent; sides slightly diverging for two-thirds of length, then gradually narrowed; apex of each elytron bidentate; surface puncto-striate, without hairs.

Abdomen with first ventral flattened and shallowly concave; last ventral with posterior margin sinuate. Front tibiae slightly arcuate, others straight.

Allotype, *Immature Male*.—Length 18 mm., width 8 mm., elytra with purple spots similar to female. Fore tibiae slightly arcuate, each with a single reflexed moderately long spine, more like *rufipes* than *gibbsi* and *viridisuturalis*.

Larva.—Thorax moderately broad, flattened, sub trapezoidal, three segmented; abdomen of medium width, flattened, ten segmented; texture rough, dull; whitish; pubescence sparse.

Head, mostly retracted into prothorax, medium sub-orbicular, not strongly chitinized, mouthparts darker; front well developed, darker anteriorly, pits large, shallow, each bearing a pair of large bristles, anterior frontal margin sinuate, anterior epistomal margin arcuate, lateral excavations of epistoma broad, with a prominent tooth near inner angle; clypeus amber, quadrangular, apparently twice as wide as long; labrum amber, subquadrangular, about twice as wide as long, anterior margin sinuate, bearing a dense row of light colored bristles; antennae in deep fossae, apparently three jointed, basal joint large, sub-conical, 2d nearly as long, sub-cylindrical, outer distal margin fringed with bristles, 3d very small, telescoped into tip of 2d, bearing a long, lateral sub-distal light bristle; mandibles broad, well developed, piceous, three toothed, with bases well developed, piceous, sub-quadrate and rugose; genae sub-quadrate, darker anteriorly; gula broad, dark brown; mentum and submentum fused, trapezoidal, light; labium sub-quadrate, rounded anteriorly, fleshy, rugose, anterior margin emarginate and fringed with light bristles; maxillae prominent, cardines large, fleshy, irregular, much broader at base, stipes slightly clavate, shorter than cardo, darker, palpus about same length as stipes, two jointed, 1st sub-cylindrical, bearing a long light sub-distal bristle, 2d much smaller, short, sub-cylindrical, lacinia about same length as first joint of palpus, flattened, slightly declivent, inner margin setose.

Prothorax medium, sub-pentagonal; plates well developed, dull; dorsal marked by an inverted U of smooth dark-brown median grooves with base broadest, base and ⅔ of arms of U surrounded by a reticulated rugose narrow, hood-like

area, angulated at sides, rugosities pointlike, tending to lie in rows on the ridges of the reticulations, few scattered rugosities at anterior margins of dull area within arms of U; ventral plate marked by a median groove which extends from the base for 3/4 of the distance to the anterior margin, groove widest near middle, fusiform, surrounded at apex by a broad reticulated rugose area which narrows toward base where it widens again, the whole forming a vase-like marking.

Mesothorax distinctly narrower than prothorax, short, divided into two ventrally by a deep transverse groove, large crescentic spiracle on each side in the anterior portion.

Metathorax slightly narrower than the mesothorax, about twice as long.

First abdominal segment thoracic in appearance, considerably narrower than metathorax, about same length, widest anteriorly, bearing a large fleshy median lobe dorsally and a large and two small ones ventrally, without distinct lateral folds, medium sized spiracle on each side near anterior margin; segments 2–8 flattened, longer and slightly wider than first, with distinct dorso- and ventro- lateral folds, spiracles on each side dorsad of dorso-lateral fold; 9th slightly shorter and distinctly narrower than preceding, widest anteriorly, with lateral folds, without spiracles; 10th small, conical, divided posteriorly into two fleshy lobes.

Habitat.—Middle to southern California. Described from one female (Hopk. U. S. No. 16638a), an immature male (No. 16638a), fragments of beetles and a number of larvae (No. 16638a) collected from the wood of fremontia (*Fremontodendron californicum* (Torr.)). The larvae were collected first about six miles west of Northfork, Madera County, by H. E. Burke and R. D. Hartman in May, 1921. The type female was reared from a prepupal larva collected at Northfork in February, 1922, by Hartman. The dead immature male and various sized larvae were taken at the same time. Larvae and fragments of beetles were taken by Burke and Hartman in the Swartout Valley, San Bernardino County, in September, 1923. The larva from which the female was reared pupated May 29 and transformed to the beetle on June 26, 1922, becoming fully colored about July 17th. The larvae mine the sapwood and heartwood of dead stubs on live trees. They may attack the imported Sterculias which are much used as shade trees in southern California, Fremontodendron being a near relative of Sterculia.

Holotype, Allotype and Type Larvae.—Cat. No. 26885, U. S. Nat. Mus.

Actual date of publication, March 19, 1924.

There are some things for which we can give a reason without being able to give a reasonable justification. One of these is the promiscuous description of new species. It is perfectly obvious, if we are going to deal with an insect, that it must have a name and a reference in our systematic; but it does not necessarily follow that every insect that comes to hand should be named or so referred. If all the species in the world were described—by what now passes for a legal description—a tremendous task would have been accomplished; but it is a serious question whether entomology would not be the worse off for its accomplishment, at least for a long time to come. We should have millions of names which could neither be ignored nor satisfactorily applied, and millions of descriptions that could and would be most unsatisfactorily applied to any number of different things. The systematist would find himself in the unenviable plight of the builder who had all the materials for his building dumped in a heap where he was expected to build. He'd have a large amount of work to undo and do over again. Now, it is very unlikely that all the species will ever be described so we have no need to worry over that score; but we have need to consider whether it is worth while, at this stage of the game, to describe as many as we can, or even as many as we do, whether miscellaneous and job-lot descriptions unconnected with revisional work, identifying keys, food plant or rearing records are justifiable at all. In most cases they probably are. In some they certainly are not.

The systematist is not altogether a free agent; his work not something that concerns him alone, or only those who may chance to share his interest. He is an essential co-worker in a common cause; his work a necessary part of a science of the greatest economic importance. After men, insects are man's most dangerous enemies. Everything, therefore, connected with the study of entomology has some relation to human welfare. This fact imposes certain moral obligations upon the systematist. He must discipline his creative passion and do his work in the way that will be most helpful to his fellow-workers and contribute most to practical needs. If he does otherwise, if he makes unnecessary difficulties for those who follow him he does the science and society a disservice.

Therefore, whenever we are tempted by some stray unknown form—a *Coleophora*, say, or an *Acrolophus* or *Eupithecia*—let us consider whether it will be a help or a hindrance to have a description of it cast upon the heap from which we are to build an orderly structure. Where there is any doubt let us refrain. In any event let us heed the prayer of harassed Little Jeff and "use discretion." —*Carl Heinrich.*

The collection of the immature stages of American Culicidae possessed by the U. S. National Museum represents by far the most extensive of its kind in the world. Furthermore the value of this material is greatly enhanced by the fact that it is to a large degree larval material which has been isolated and reared and to which the adults have been kept definitely attached. The modern classification of the Culicidae, embodied in the "Mosquitoes of North and Central America and the West Indies" was largely brought about through a study of the larval characters and this study was mainly based on the material in the National Collection. Since the appearance of the mosquito monograph the collection of larvae has been greatly increased, particularly in North America and Panama species and in numerous cases there are species represented by scores of larvae and last larval skins.

The total number of specimens of immature stages is in the neighborhood of 20,000. By actual count larvae of 106 out of 121 or 87.6% of the Culicidae occurring in the United States are known and from Panama 92 out of 133 species or 69.4%.

—*H. G. Dyar and R. C. Shannon.*

In giving the note on the material in the National Collection of Cynipidae in the April (1923) number of these Proceedings some of the figures were somewhat inaccurate. I did not take into consideration the exotic species in the Museum of Comparative Zoölogy, and the number of species in this collection should have been reported as 403; nor, did I consider some of the more recently acquired species in the American Museum of Natural History. Statistics of the number of species are, at best, of momentary value and one is always uncertain as to whether the figures are entirely up to date. For the National Museum the previous note listed as species only those forms which are recognized as such in the arranged collection, omitting all synonyms, names proposed on galls only, alternating forms, and incipient varieties.

In the previous note it was not intended to say anything about private collections. It seems, however, at this time desirable to call attention to the more extensive personal collections in this country, namely, those belonging to Alfred C. Kinsey, William Beutenmueller, and L. H. Weld. The first two are composed mostly of gall-making species and contain many types, as well as authentic material of previously described species. The last mentioned collection has, besides gall-making species, a fair representation of parasitic forms as well.

In my first note it was not intended to glorify the National Collection over and above all others, but rather to call attention to the vast amount of material already accumulated with the hope that it would stimulate other students to assist in building up the National Collection in which all patriotic Americans should be greatly interested.

—*S. A. Rohwer.*

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A NEW SPECIES OF CONICERA FROM PORTO RICO (PHORIDAE; DIPTERA).

By J. R. Malloch.

The species described herein was found in the stomach of the Humming-bird *Anthracothorax aurulentua* A. & V., a common species in Porto Rico. In the account of the birds of the island in Bulletin 326, U. S. Department of Agriculture, 1916, page 74, the fly is listed as *Conicera aldrichi*, but the latter is so far as I know confined to the northwestern United States.

The type of the new species will be deposited in the United States National Museum, paratypes being retained in the collection of the Biological Survey.

Conicera latimana, new species.

Male.—Tawny yellow, frons, dorsum of thorax, and all except the narrow apices of abdominal tergites fuscous; hypopygium yellow; apical segment of fore tarsus fuscous; wings clear; halteres yellow.

Upper frontal series of four bristles straight, lower series convex; postantennal pair of bristles very small, divergent, reclinate; third antennal segment bulbous at base and slightly pear-shaped, the apex drawn out into a slender process which is fully as long as the swollen basal part, and like it densely pubescent; palpi slender and not very large, with some short black bristles. Thorax with rather numerous short black hairs on dorsum, and two prescutellar dorsocentrals; scutellum with two strong bristles; mesopleura bare. Abdomen robust, hypopygium large, asymmetrical, one side with a strong curved process. Fore tarsi flattened, basal segment longer than wide, with a slender fringed process at its apex on anterior side; fore tibia with two median anterodorsal bristles; mid tibia with two closely placed dorsal bristles about one-third from base and one anterior preapical bristle; hind tibia with one anterodorsal bristle about one-third from base. First costal division over three times as long as second; costal vein and apex of third thick, costal setulae less than twice as long as diameter of costal vein; fourth vein almost straight, ending in costa in front of apex of wing. Length, 2 mm.

Type and 6 paratypes, Ciales, Porto Rico, July 13, 1913, stomach of Anthracothorax (A. Wetmore). U. S. N. M. Cat. No. 26821.

A NEW GENUS AND SPECIES OF MUSCIDAE (DIPTERA).

By J. R. Malloch.

The genus included in this paper is an aberrant one and is not clearly referable to any subfamily of Muscidae as at present defined. It finds its closest affinities in the subfamily Phaoniinae to which it is tentatively referred.

The type is in the United States National Museum collection.

COENOSOPSIA, new genus.

Generic characters: Frons of male one-third of the head width; ocelli distinct, triangle glossy, ocellar bristles long and strong, each orbit with two backwardly directed and one strong forwardly directed supraorbital, and two or three incurved infraorbital bristles; interfrontalia with a strong pair of cruciate bristles; eyes bare, about twice as high as long; parafacial not visible from side; cheek not as high as width of third antennal segment; arista plumose, the hairs of unequal lengths. Thorax with two pairs of presutural dorsocentrals; prealar short; sternopleurals 1 : 2, the posterior lower bristle short; hypopleura and pteropleura bare; scutellum short, projecting but little over postnotum, bare below, with four marginal and two short discal bristles, and a few setulose hairs on sides. Legs as in Phaonia R. D. but with a distinct bristle at base of hind metatarsus below. Wing as in Phaonia, but the surface with more evident and sparser hairs and the membrane raised at the base of each hair; sixth vein very short. Lower calyptra hardly protruded.

Genotype.—Coenosopsia prima, new species.

Coenosopsia prima, new species.

Male.—Black, shining. Head with the anterior part of frons, face, cheeks, antennae, and palpi brownish red. Thorax grayish pruinescent, and not noticeably vittate on dorsum. Abdomen yellowish at base and apex of first segment and at apices on each side of other tergites. Legs pitchy black, fore coxae and all trochanters yellowish. Wings hyaline. Calyptrae white. Halteres yellowish.

Third antennal segment about three times as long as second; vibrissae strong; palpi of moderate size. Presutural acrostichals 4-rowed, pre-scutellar pair long; both intra-alars distinct. Abdomen short, almost parallel-sided; hypopygial forceps long and rather slender. Fore tibia with a median posterior bristle; mid tibia with two or three posterior bristles; hind femur with one strong preapical anteroventral bristle and one or two short bristles basad of it; hind tibia with one posterodorsal, one anteroventral and two anterodorsal bristles. Inner cross-vein a little proximad of middle of discal cell; last section of fourth vein about equal in length to discal cell; outer cross-vein straight, at its own length from apex of fifth vein.

Length, 2 mm.

Type.—Higuito, San Mateo, Costa Rica (P. Schild). (U. S. Cat. No. 26698.)

NOTES ON THE GENUS DIKRANEURA IN THE UNITED STATES (HOMOPTERA; EUPTERYGIDAE).

By W. L. McAtee.

The following notes resulting from intermittent study of this genus extend knowledge of the ranges of seven species and add one new species and two new varieties to the list of described forms.

D. maculata Gillette.—Louisiana (C. F. Baker, U. S. N. M.); Church's Id., N. C., Oct. 17, 1918, on hackberry, W. L. McAtee; Chain Bridge, Va., April 23, 1922, J. R. Malloch; Plummers Id., Md., Sept. 14, Oct. 12, 26, 1913, July 19, Sept. 13, 1914, W. L. McAtee.

D. cruentata Gillette.—The principal color vittae of this species vary from scarlet to pale yellow. The holotype (N. Y., No. 2046, U. S. N. M.) lacks markings on the head and thorax, has the vittae on tegmen distinct, and dusky band over cross-veins broad. I group with this those forms having color vittae present on vertex and pronotum, and the angles of the scutellum spotted.

Two other color varieties appear to be worth naming.

Dikraneura cruentata lavata, new variety.

Practically no color markings, sectors near cross-veins and latter in part dark.

Plummers Id., Md., Sept. 14, 1913 (♂ holotype), Windy Run, Va., Oct. 16, 1921, W. L. McAtee.

Dikraneura cruentata rubricata, new variety.

Scutellum entirely red, red markings on tegmen broader and smoky band in front of crossveins more conspicuous than usual in the species.

Virginia near Plummers Id., Md., Sept. 5, 1915, W. L. McAtee (holotype ♀); paratypes Chain Bridge, Va., Oct. 2, 1921, J. R. Malloch.

The foregoing data extend the recorded distribution of the species and we may mention also specimens of the typical variety from Onaga, Kans., F. F. Crevecoeur, and Los Angeles, Calif., D. W. Coquillett.

D. unipuncta Gillette.—The color vittae vary from greenish yellow, through yellow to red in this species. Records extending the published distribution are: Verde Valley, Ariz., Sept. 20, 1922, H. R. Brisley; Graham Mts., Ariz. (Ash Creek, 3200 ft.), July 4, 1914, E. G. Holt; Utica, Miss.; Alabama (C. F. Baker); and Biscayne Bay, Fla. (U. S. N. M. except second record Biol. Survey).

D. abnormis Walsh.—The color markings of this species also vary from red to yellow, and in both cases individuals occur that

lack markings except on tegmina. The variety *rufula* Gillette applies to a type of color variation which it is inexpedient to name in this family.

D. cockerelli Gillette.—The tegminal venation and color of this species is very distinctive; the conspicuous black spot although it lies in an area of the tegmen which would be enclosed between the 3d and 4th sectors if produced, and it would seem could more naturally fall in the 3d apical cell, nevertheless is in the 4th apical cell, the boundary of which seems stretched for the precise purpose of enclosing this spot. The species like most of the family varies in markings from red to yellow. Specimens of both the red and yellow types are at hand from Higley, Ariz., July 18, 1917, and Graham Mts., Ariz. (Ash Creek, 3200 ft.), June 19, July 4, 1914, E. G. Holt.

D. kunzei Gillette.—Numerous specimens from the Graham Mts., Ariz. (Ash Creek, 3200 ft.), May 30, June 15, 21, 25, 1914, E. G. Holt; (Biol. Survey) also from Victoria, Texas, July 29, 1903, and Aug. 15, 1915, the latter labelled as defoliating huisache, collected by J. D. Mitchell (U. S. N. M.). I would not say of these as does the original description that the vertex and scutellum lack distinct markings. The reddish markings on these areas and upon front of pronotum also have a real pattern.

D. carneola Stal.—When the color of tegmina is not solid it is seen to consist essentially of vittae along the sectors. These vary in color from pinkish red to golden, sordid, and paler tones of green. The vertex in this species is much shorter than in the sometimes similarly colored *D. abnormis* Walsh. Numerous specimens from Willard, Utah, October 5, 1914; Promontory, Utah, Oct. 6, 1914; Mouth of Bear River, Utah, Sept. 30, 1914, Ogden, Utah, May 16, 1915, Bountiful, Utah, Aug. 2, 1914; Emigration Canyon, Utah, Aug. 9, 1914; Chiricabua Mts., Ariz., (Barefoot Pass, 8000 feet) July 3, 1919, Alex. Wetmore; Portland, Ore., June 6, 1915, A. K. Fisher, (Biol. Survey).

D. fieberi Loew.—Woodstock, Vt., A. P. Morse (M. C. Z.)

Dikraneura mera, new species.

General color milky white, the eyes brownish and the clavus, tip of ovipositor, and small wedge-shaped spot on each tegmen at end of first sector black; tegmen whitish-hyaline, costal plaques milky. Length: 3 mm. The position of black spots on the tegmina of various species of Dikraneura is quite constant and characteristic; the present species has the spots in a different position from any of the previously described species of the United States.

Holotype ♀, Beltsville, Md., June 23, 1918, on *Quercus alba*, W. L. McAtee.

NOTES ON THE STRUCTURE OF BEES.

By T. D. A. Cockerell, *University of Colorado, Boulder, Colorado.*

I. CERATINIDAE AND XYLOCOPIDAE.

These families are strikingly diverse in their mouth-parts as follows:

Maxillary comb of closely set long spine-like bristles, on a strongly concave margin; at apical end of comb, next to base of maxillary palpi, a long finger-like lobe; maxillary blade very broad; third joint of labial palpi strictly terminal on second.....Xylocopidae.

Maxillary comb of less closely set bristles, on a gently concave long margin; no lobe at apex of comb; maxillary blade elongate, or not very broad (slender and tapering at end in *C. binghami* (Ckll.); third joint of labial palpi attached to side of second near end.....Ceratinidae (*Ceratina*)

In *Xylocopa* the second joint of labial palpi is not half the length of first; in *Ceratina* it is considerably over half the length.

Minor differences within the Xylocopidae are such as the following:

Second joint of labial palpi stout and strictly cylindrical, with few (about 7) bristles on each side.....*Lestis bombylans* (Fabr.)

Second joint of labial palpi slender, narrowed in middle.....*Xylocopa.*

Second joint of labial palpi with very many bristles, on both sides.....
X. frontalis nitens (Lepeletier).

Second joint of labial palpi with few bristles (7 or 8), on one side only, except a few minute ones at apex on the other side.

Second joint of maxillary palpi stout, the following ones slender.....
X. barbata (Fabr.).

Second and third joints of maxillary palpi stout, the following ones slender.....*X. arizonensis* Cress.

Ceratina shows marked differences, thus:

Subgenus **CERATINA** Latr.

Type *cucurbitina* Rossi. Black species with 5-jointed maxillary palpi; apex of ♂ abdomen truncate; second joint of labial palpi broad and not especially long; last joint of maxillary palpi not or not squarely truncate. An American species differes from the European thus:

Maxillary palpi fully half length of blade.....*C. arizonensis* Ckll.

Maxillary palpi considerably less than half length of blade; apical joint of labial palpi slender, very obliquely subtruncate apically.....
C. cucurbitina Rossi.

CALLOCERATINA, new subgenus.

Type *Ceratina amabilis* Ckll. Metallic species with 5-jointed maxillary palpi; tongue hardly surpassing labial palpi (far surpassing it in *C. cucurbitina*); second joint of labial palpi very long and slender; apical joint of labial palpi broadly and abruptly truncate at end.

In *C. cucurbitina* and *C. lepida* Smith the second joint of labial palpi is considerably shorter than the first; in *C. cyanea* (Kirby) the second joint is slightly longer than the first. *C. lepida* and *C. cyanea* have 6-jointed maxillary palpi.

Subgenus **CREWELLA** Ckll.

Type *C. titusi* Ckll. Maxillary palpi 6-jointed; mouth-parts greatly elongated; mandibles peculiar. South America.

Subgenus **CERATINIDIA** Ckll. and Porter.

Type designated C. *hieroglyphica* Sm., but specimen studied was *C. lepida* Sm.; they are very closely related. Black species, with 6-jointed maxillary palpi. A distinct and compact subgenus of the Oriental and Palearctic Regions.

Subgenus **PITHITIS** Klug.

Type *smaragdula* Fabr. Bright green species of Oriental and Ethiopian Regions, with 6-jointed maxillary palpi (*C. binghami* Ckll. studied).

Subgenus **ZAODONTOMERUS** Ashmead.

Type designated *tejonensis* Cresson. Dark green species with 6-jointed maxillary palpi (although Ashmead said 4-jointed). Widely distributed in both hemispheres.

II. THE MAXILLAE.

The structure of the maxillae, including the palpi, has for many years been regarded as furnishing important characters for classification. There are however additional features which have received scant attention, and some of these may serve our purpose in establishing a better taxonomic system. Maxillae of insects are often characterized by the possession of combs, consisting of specialized bristles, and stiff more or less broadened, inclined to be curved apically. Thus in termites a well-developed comb may be seen on the lacinia. Among the bees, I find two combs, situated in different positions.

(A) *The inner comb*, placed mesad of the palpus, on the basal part of the galea. This is particularly well developed in *Caupolicana yarrowi* Cresson.

(B) *The outer comb*, placed basad of the palpus, on a more or less concave margin of the stipes, or more properly I suppose the united palpifers. This is very highly developed in *Xylocopa*.

The presence of the inner comb distinguishes those bees which are considered less advanced, and the presence of the outer those which are very highly modified. *Hylaeus*, *Meroglossa*, *Palaeorhiza*, *Colletes* and *Caupolicana* all have the inner comb very well developed. The lacinia in these genera is reduced to a small finger-like structure, beset with bristles.

In *Andrena* the inner comb is very well developed, but the lacinia is shorter and stouter, sometimes (*A. mellea* Cresson) broader than long.

Melitta (*M. leporina* Panzer) has no inner comb, and the lacinia is cylindrical. The outer margin of the stipes is hairy all along, the basal half having excessively long hairs. In *Andrena* there is usually much less hair in this situation, but it may be long and abundant, (as in *A. porterae* Ckll. and *A. flavipes* Panzer), though even then not excessively elongated toward the base as in *Melitta*. There is no trace of any apical division of the galea in *Melitta*.

Nomia has a well-developed inner comb, and narrow lacinia.

Sphecodes has no inner comb; it has a primitive feature in the galea, the apical part being distinctly separated, a condition more strongly emphasized in *Vespa*. *Temnosoma* resembles *Sphecodes*, but the maxillary palpi are stouter.

Halictus has no inner comb, and the terminal portion of the galea is separated by a line or suture as in *Sphecodes*. Thus *Halictus* and *Sphecodes* stand apart from *Nomia*, which has no apical division of the galea. In the Colletids there is no transverse division of the galea, but *Colletes* shows a longitudinal division, the separation between the heavily chitinized outer and the hyaline, hairless, inner division being unusually distinct. In the Hylaeids there is also no trace of an apical division. Thus it appears probable, contrary to expectations, that the Halictines have an origin apart from the Andrenines, and not from any Colletid or Hylaeid stem.

In *Augochlora* and *Agapostemon* the division of the galea becomes extremely oblique, but is still quite distinct from the longitudinal line between the darker and lighter parts. In all these Halictine bees the lacinia has disappeared.

In *Protandrena* (*P. mexicanorum* Ckll., *P. bancrofti* Dunning) there is a well-developed inner comb, the lacinia is present and there is no trace of a transverse division of the galea. (The labial palpi of *P. bancrofti* have the first joint much longer and more slender than in *P. mexicanorum*).

Halictoides has no transverse division of galea and no inner comb. The lacinia is well developed and long, but very delicate, and easily lost in the preparations. (The labrum of *H. tinsleyi* Ckll. is markedly different from *H. campanulae* Ckll.; probably the labra in this group are significant for subgeneric division).

Rhophites (*R. quinquespinosus* Spinola) has the galea long and tapering, of course without transverse division. There is no inner comb. The same may be said of *Panurgus*. In *P. banksianus* (Kirby) the rudimentary lacinia is beset with numerous very long stout dark plumose hairs.

Calliopsis (e. g. *C. coloradensis* Cresson, *C. verbenae* Ckll. and Porter) has a very well developed inner comb, its upper end a moderate (*coloradensis*) or great (*verbenae*) distance basad of the palpi. The galea has of course no transverse division. The rudimentary lacinia bears quite simple bristles. *Spinoliella* (*S. scitula* Cresson) has a well developed inner comb, as in

Calliopsis. *Panurginus* also has a well developed inner comb, and simple bristles on the lacinia.

Perdita has no inner comb. The bristles on the very rudimentary and basad lacinia are sometimes (*P. albipennis* Cresson) briefly plumose.

Has the inner comb been lost in two or more series of Panurgids independently? The Panurgids as a whole must be derived from the Andrenine series, not from the Halictine. If the evolutionary sequence has been Colletoids, Andrenoids, Panurgoids, with the Halictines coming independently from some different, unknown ancestor, it becomes necessary to accept the family Halictidae, which will include *Sphecodes*, but not *Nomia* or *Melitta*.

In none of the bees considered above is there any trace of an outer comb.

Nomada has no inner comb. The margin below the palpi for a considerable distance is gently concave, and beset with small hairs, but these are irregular and do not constitute any sort of comb. In *Triepeolus* there is no inner comb; there is a slightly concave area below the palpus much as in *Nomada*, only it is quite abruptly terminated basad, and here some of the bristles become broadened, and we have the first distinct indication of an outer comb. On the other hand *Pseudomelecta* presents in this region merely a straight edge, without any bristles projecting from the margin. *Crocisa* in this agrees with *Melecta*, except that there are a very few minute hairs. *Phileremus mesillae* Ckll. has the margin gently concave in the style of *Triepeolus* but it is less pronounced, and there are no distinct hairs. *P. americanus* Cresson is nearly identical with *mesillae* in these features. *Phileremulus nanus* Ckll. has the margin below the palpus very faintly evenly concave, with a very few minute hairs. *Neolarra pruinosa* Ashm. has more though irregular hairs. *Oreopasites scituli* Ckll. has this region as in *Phileremulus*.

All these parasitic bees lack the inner comb. They may possibly be derived from bees which had the outer comb, but this can not be shown to be the case, so far as the characters now considered are concerned. *Triepeolus* only has a distinct vestige of an outer comb, but *Phileremus* may be derived from it by degeneration.

The Anthophorid genera, *Anthophora*, *Anthophoroides*, *Emphoropsis*, *Diadesia*, *Centirs*, *Melissodes*, *Tetraloniella*, *Tetralonia*, *Melissina*, *Xenoglossa* and *Exomalopsis* all have a very well developed outer comb. This character, together with the absence of the inner comb, indicates their distinctness from the Andrenine series. I find, however, two exceptional forms within the Anthophoridae. The margin on which the comb is set is less concave than usual in the species of *Exomalopsis*, and in *Dasiapis* (*D. ochracea* Ckll.) it is very little concave, and although there is a true comb, there are also many long hairs.

Melitoma (*M. grisella* Ckll. and Porter), which has an extraordinary long and whip-like galea, has no comb. The margin is merely beset with stiff hairs, placed irregularly, and many of them branched. Thus *Melitoma* stands quite apart from the other Anthophoridae.

Xylocopa has an extremely strong outer comb, on a very concave margin. In *Ceratina* the margin is much less concave, but there is a good comb. *Eulaema* has a dense comb of stout curved spiniform bristles on a practically straight base. *Bombus* has a good comb on a gently concave surface (not at all the specialized structures of *Xylocopa*), but the basad end grades into simple hairs. *Psithyrus* has a comb resembling that of *Bombus*. In *Apis* there is a pronounced, rather short concavity, but the comb-like structures exist only on the basad part. Thus the Xylocopidae, Ceratinidae, Bombidae, Euglossidae and Apidae agree with Anthophoridae in possessing an outer comb, as well as lacking an inner one. Such partial exceptions as *Apis*, or complete exceptions like *Melitoma*, indicate secondary specialization.

The Megachilidae still remain to be considered.

Megachile has no inner or outer comb. The margin below the palpus is strongly convex, but presents a certain number of bristles, which in some species are thickened and spiniform. I think these represent the vestiges of an outer comb. The remarkable feature in *Megachile* is the comb often present on the elongate laciniae. In some species (e. g. *M. fidelis* Cress.) the lacinia merely presents some stout bristles at the end. In others there may be also large lateral bristles; but in *M. apicalis* Spinola there is fringe or comb of very long bristle-like hairs. In *Coelioxys* the convex margin below the palpus presents only a very few minute hairs, not at all suggesting a comb. The lacinia may have the hairs practically confined to the end, or may be hairy down the side.

Chalicodoma (*C. caementaria* Meinecke) has merely minute hairs on the convex margin below the palpus. The very stout lacinia has hairs down the side.

Trachusa (*T. serratulae* Panzer) is very remarkable. The galea, palpus and outer face of stipes are excessively bristly, but there is no comb. The basad part of the stipes bears very long finely plumose hairs, recalling the condition common in Anthophoridae.

Anthidium (*A. manicatum* of Europe, and related American species) has a very well-developed outer comb, set on a moderately concave surface. The lower (basad) teeth are very stout, long and curved; they gradually decrease in size apicad, becoming minute at the end of the concavity. The lacinia is broad, and thickly beset with long hairs on the outer edge.

After seeing these, it was astonishing to find the comb totally

absent in other Anthidiines. In *Protanthidium* (*P. steloides* Bingham) the margin below the palpus is nearly straight, and has a good many minute hairs, but no sort of comb. In *Dianthidium* (*perpictum* Ckll., *interruptum* Say, *gilense* Ckll., *parvum* Cresson, *strigatum* Panzer) the margin below the palpus is convex, with a few fine hairs, and no trace of a comb, except that in *D. perpictum* and *D. interruptum* I see a few small scattered spines. The lacinia of *Dianthidium* is just like that of *Anthidium*.

The Osmiines are after the fashion of *Dianthidium*, and have no comb, but in *Osmia brevis* Cresson I find the margin of the stipes with a gentle double curve and all along a series of small dagger-shaped spines, not uniform in size. Other species of *Osmia* show this more or less. *Hoplitis mescalerium* Ckll. has the double curve, but the bristles are not distinctly spiniform. In *H. graceae* Ckll. there are merely small hairs of different sizes on a gently convex margin. *Osmia lignaria* Say has bristles on the margin, and a lacinia just like that of *Anthidium*. *Formicapis* has minute bristles of different sizes on a gently convex margin.

The following key may help to summarize the more essential points:

Apical segment of galea remaining more or less distinct; lacinia evanescent; no inner or outer comb.....HALICTINAE.

Apical segment of galea entirely united with that before.....1.

1. Outer comb absent (in *Triepeolus* apparently vestigial).....2.

   Outer comb present.....ANTHOPHORIDAE (except *Melitoma*), XYLOCOPIDAE, CERATINIDAE, *Anthidium*. BOMBIDAE, EUGLOSSIDAE, APIDAE.

2. Inner comb well developed.....HYLAEIDAE, COLLETIDAE, ANDRENINAE, *Nomia*, *Protandrena*, *Calliopsis*, *Spinoliella*, *Panurginus*.

   Inner comb absent.....*Melitta*, *Halictoides*, *Rhophites*, *Perdita*, *Nomada*, EPEOLINES, MELECTINES, PHILEREMINES, MEGACHILIDAE (except *Anthidium*), *Melitoma*. (The Megachilidae and *Melitoma*, and presumably some of the parasitic bees, outer comb losers; the others without any outer comb ancestry.)

III. PANURGIDAE OR PANURGINAE OF AUTHORS.

Tribe CALLIOPSINI. (Calliopinae Robertson, Psyche, 1922.)

Panurgine bees with well developed inner comb; nearly always with light face-markings, at least in the males. Related to Protandrenini (Protandreninae, Robertson), but with only two cubital cells. For other character see Robertson.

The following key brings out some of the characters within the group:

Maxillary palpi less than half length of galea; palpus to tip of galea a greater distance than to base of stipes.....*Verbenapis verbenae* (Ckll. and Porter).

Maxillary palpi shorter than galea, but considerably over half its length.

End of galea sharply pointed, with no terminal brush of hair; palpus not so far from tip of galea as from base of stipes.....
Hypomacrotera subalpina (Ckll.), and *H. semirufa* (Ckll.)
(believed to be sexes of one species.)

End of galea rounded, with a strong terminal brush of hairs; palpus about midway between tip of galea and base of stipes.....
Calliopsis coloradensis Cresson.

Maxillary palpi longer than galea; tip of galea with hairs; stipes longer than galea beyond palpus.

Galea broad and short, its inner margin strongly convex; second and third joints of labial palpi short and broad.....
Hypomacrotera callops Ckll. and Porter.

Galea ordinary; second and third joints of labial palpi long and rather slender.....*Calliopsis rhodophilus* Ckll.

There appears to have been more or less parallel evolution in *Calliopsis* and *Hypomacrotera*, but the latter genus always has a shorter tongue than *Calliopsis*. *Hypomacrotera subalpina* further differs from *H. callops* in having the second and third joints of labial palpi long and cylindrical.

Spinoliella (*S. scitula* Cresson) falls in the third division above, having the maxillary palpi considerably surpassing end of galea. The tip of galea is hairy, and the inner margin is straight; second and third joints of labial palpi cylindrical. The tongue is not very long, but narrow as in *Calliopsis*.

Pseudopanurgus aethiops (Cresson) is remarkable for the very long (fully 1 mm.) first joint of labial palpi; this joint is not thus elongated in *Panurginus*. *P. aethiops* has the tongue moderate, maxillary palpi not reaching end of galea, end of galea with bristles. In *Panurginus* (*P. boylei* Ckll.) the maxillary palpus does not reach end of galea; the palpus is distinctly nearer tip of galea than base of stipes; the inner comb has ten rather widely spaced teeth or spines.

Tribe PERDITINI—(Perditinae Robertson, l. c.)

See Robertson for characters; the inner comb is lost. The maxillary palpus goes well beyond middle of galea, but does not reach its tip. In the subgenus *Cockerellia* (*P. albipennis* Cress., *P. lacteipennis* Swenk and Ckll., *P. albovittata* Ckll.) the maxillary palpus does not nearly reach half-way to the end of the tapering galea. Thus the development parallels that of *Verbenapis*, but the latter has the first joint of labial palpi much more elongated.

Tribe RHOPHITINI, new.

Type *Rhophites* Spinola. The inner comb is lost, and there is no trace of the outer comb. The remarkable feature is seen in the labial palpi. The first two joints are broadened, clearly prophetic of the normal condition in the higher bees. In the less specialized genus, *Rhophitoides* Schenck (*R. canus* Eversmann) the labial palpi go a little beyond the tongue; the two broad joints are of about equal length, and only moderately long, the third is much shorter and claviform,

while the fourth is about as long as the third, but very slender. All these joints are in the same straight line. In *Rhophites* (*R. quinquespinosus* Spinola) the first two joints are long and broad, much longer than in *Rhophitoides;* the third is short, but broad like the one before, and continuous with its suture being indistinct; the fourth is slender and cylindrical (slightly claviform) and diverges from the side of the tip of the third as do the small joints of the higher bees from the tip of the second.

In *Rhophitoides* the maxillary palpi extend far beyond the galea, but in *Rhophites* they do not nearly reach its end. Thus the two genera are very distinct, although Friese combines them. Friese remarks that *Rhophites* stands nearest to *Halictoides* and *Dufourea;* but these genera (in which the maxillary palpi far exceed the galea) have ordinary labial palpi, and form a separate tribe DUFOUREINI (part of Dufoureidae Robertson).

IV. THE GENUS MELITTURGA LATREILLE.

The name is usually spelled *Melitturga*, but Alfken states that Lattreille wrote *Melitturga.* I have seen Latreille's type in the Oxford (Hope) Museum. Fourteen species are at present known, ranging from South Africa (*M. capensis* Brauns) to Algeria (*M. rubricata* Morice, *M. algeriensis* Friese), and from western Europe to Persia (*M. caucasica* Morawitz), Transcaspia (*M. pictipes* Morawitz) and the Altai region (*M. clavicornis* Latreille). The apparently discontinuous distribution of *M. pictipes* (Transcaspia and Algeria) was due to a distinct Algerian form (*M. algeriensis*) being taken for *pictipes.*

The position of this genus has long been in doubt. Friese placed it in the Anthophoridae, after *Eucera.* In Ashmead's key it falls between *Melissodes* and *Melitoma.* A study of *M. clavicornis* shows that this is not its true position.

The maxillae have the following characters:

Palpi fairly long, but not nearly reaching end of galea, with six sub-equal joints, the fifth shortest, the first two conspicuously stouter than the others; galea nearly parallel sided, heavily chitinized, the very obtuse end with many strong bristles; margin of stipes basad of palpus straight, with many outstanding hairs, but no trace of a comb; inner comb very well developed, with about fifteen stout red teeth. The tongue is of the long parallel-sided type, but not extremely long; the labial palpi have the first joint longer than the others together, but not flattened, though about the last three-fifths are thickened, and very hairy on one side. The second joint is longer than the last two together; the latter are about equal, and diverge from the straight line of the basal joints.

Both sexes have the clypeus brownish-white; the male has large eyes and a narrow vertex, with the ocelli just above the antennae, and the flagellum is strongly clavate; the labrum is transverse, quadrate, with a longitudinal median groove but no process. The apex of the male abdomen is bispinose. The basal

nervure falls far short of the nervulus; stigma small; three cubital cells, the second receiving first recurrent nervure at its end; marginal cell very broadly obliquely truncate at end.

This bee has nothing to do with the Anthophoridae. It shows a good many points in common with the Neotropical Oxaeinae, which however have no inner or outer comb, and differ conspicuously in other respects. *Melitturga* must stand as the type of a subfamily MELITTURGINAE which will have to be placed for the present under the Panurgidae, a family with uncertain limits. It is to be regarded as a member of the Andrenid-Panurgid series.

A NEW GENUS AND SPECIES OF PIESMIDAE (HEMIP.).[1]

By CARL J. DRAKE.

The family Piesmidae, although widely distributed in the holarctic region, has been heretofore represented by only a single described genus, *Piesma* of Lepeletier de Saint-Fargeau et Serville. Through the kindness of Mr. W. L. McAtee the writer has been permitted to study some undetermined Tingitoidea in the National Museum. Among this material there are four specimens of an apparently undescribed genus and species of Piesmidae from Australia.

MCATEELLA, new genus.

Head broad, nearly truncate in front, the jugae and tylus equal or slightly subequal in length. Ocelli present, inconspicuous, placed near the anterior margin of the pronotum. Antenniferous tubercles large, prominent, slightly curved inwardly. Antennae rather long, moderately stout; first and second segments short, the former greatly swollen; third segment slenderest, considerably longer than either the first or second, but a little shorter than the fourth; fourth segment swollen towards the apex, fusiform, longer than the third. Rostral sulcus deep on the head, the bucculae thin, rather high, moderately incurved; rather deep and narrow on the prosternum, shallow and narrow on the mesosternum and disappearing on the metasternum. All coxae placed rather close together. Metasternal orifice present, with a distinct, latero-projecting plate beneath. Pronotum above very coarsely punctate, the median carina not very distinct, the lateral carinae wanting; lateral margins of the pronotum dilated in front. Scutellum exposed, granular, with a small calloused tubercle at the apex. Elytra (macropterous form) coarsely punctate, a little longer than the abdomen with a distinct clavus as well as costal, subcostal, discoidal and sutural areas. Wings present. The brachypterous form is unknown. In the long-winged forms the elytra are entirely coriaceous and the discoidal area is not divided by a longitudinal vein.

[1]Contribution from the department of Zoology and Entomology, Iowa State College, Ames, Iowa.

Type of genus, *Mcateella splendida*, new species, in the National Museum. This genus is named in honor of Mr. W. L. McAtee, who has taken a very keen and active interest in the species of Piesmidae.

The genus *Piesma* differs from the genus *Mcateella* in having the jugae distinctly produced and longer than the tylus, the differently formed elytra, and the pronotum with five more or less distinct carinae.

Mcateella splendida, new species.

Antennae rather long, moderately stout, finely and sparsely pilose; first segment greatly swollen, moniliform, very small at the base, about equal to the second in length, the latter only slightly swollen; third segment quite slender, its length about equal to that of the first and second conjoined; fourth longest, more strongly swollen beyond the middle, fusiform. Jugae and tylus equal or slightly subequal in length. Eyes rather prominent, coarsely granulate. Pronotum coarsely punctate, transversely swollen behind the middle, truncate in front, broadly rounded behind; median carina not very distinct. Paranota more broadly expanded in front, projecting a little in front of anterior margin of the pronotum, entirely wanting behind, punctate. Elytra entirely coriaceous (no membraneous portion); costal area narrow, short, becoming entirely evanescent before it reaches the end of the basal fourth of the elytra, bipunctate in front; subcostal area broad, composed of eight or nine rows of punctures at its widest part; discoidal area broad, extending a little beyond the middle of the elytra, composed of seven or eight rows of punctures at its widest part. Wings a little longer than the abdomen. Length, 2.65 mm.; width, 1.26 mm.

Color: General color pale stramineous, with brown markings. Each elytron with an oblique transverse brown band, formed by a large spot at the apex of discoidal area and an oblique transverse band in subcostal area. The pronotum, except collum and paranota, scutellum and basal portion of each clavus brown (type). Body beneath pale stramineous, the thorax darker. Rostrum dark brown.

Type, female, Cat. number 25,752 U. S. N. M., from Australia, collected by Koebele. The three *paratypes* bear the same locality and collector labels as the type. The three paratypes show considerable variation in color as follows: (1) pronotum and elytra almost concolorous, the transverse band almost obsolete; (2) pronotum and elytra practically concolorous, the transverse brown band very prominent as in type; (3) seems to be somewhat teneral and slightly variegated with a pinkish tinge. The elytra of the latter show a faint indication of a few extra costate nervures, but these nervures entirely disappear in fully indurated specimens. The type (genoholotype) is more prominently marked with brown than any of the paratypes.

DESCRIPTIONS OF THREE SPECIES OF TIPHIA PARASITIC ON POPILLIA JAPONICA (HYM.).

By S. A. Rohwer, *Bureau of Entomology, Washington, D. C.*

For some time the members of the Bureau of Entomology stationed in the Oriental region studying parasites of the Japanese beetle (*Popillia joponica* Newman) have been rearing various species of *Tiphia* from this host. In connection with this work they have collected many other specimens of *Tiphia* and have been able to rear some of them from other Scarabid larvae. Most of this material has been referred to me for study and identification and I have sorted all of the specimens into species and made an effort to identify them with those already described. The field work on these species of *Tiphia* is to be continued, and inasmuch as some of the species are not represented by very many specimens it seems advisable to delay publication of a report on all of the species until some future time. They wish, however, to have names of the three species described below so they may be available for use in publications.

Unfortunately, the earthquake destroyed some of their notes and specimens and it has not been possible to positively associate one of the species with the rearing records. Mr. Clausen, however, feels reasonably certain that the species here described as *autumnalis* is the one which lays its eggs dorsally on the thorax of larva of *Anomala* and occurs in considerable abundance in autumn in Korea.

The life-history observations and notes on the habits of the species are, with the permission of Messrs. C. P. Clausen and J. L. King, included to facilitate the association of species with field notes. The field and laboratory work on these species was done jointly by Clausen and King and will be described in more detail in a paper which they have in preparation.

In describing these species, I have made an effort to indicate where they will fall in available classification of the North American species so as to assist American students to place these introduced forms when they may be recovered in the United States. The descriptions of the species of *Tiphia* described from Japan and the neighboring countries are very brief, and it has been impossible to satisfactorily identify many of these forms. Because of the doubt, it has been deemed advisable to describe all of the species as new, leaving it to the future to determine whether the species are valid.

To facilitate the identification of these three species the following key has been prepared The characters in brackets are specific characters which will aid in sorting the species from related ones which will agree in the unbracketed characters of the couplet.

Oriental Tiphiae recorded as parasites of Popillia japonica.

1. Inner side of hind basitarsus without a longitudinal groove; propodeal enclosure distinctly narrowing posteriorly and with the median carina wanting or greatly reduced; about 12 mm. long; [anterior and dorsal margin of pronotum separated by a carina; side of pronotum without a groove; second intercubitus strongly curved]; Morioka, Japan and Korea ..... *autumnalis*, new species.

Inner side of hind basitarsus with a longitudinal groove; propodeal enclosure nearly parallel-sided, the median carina strong, complete; about 10 mm. long ..... 2.

2. Anterior and dorsal margin of the pronotum separated by a carina; [legs black; basal part of pygidium striato-punctate, the apical part very minutely sculptured]; Japan and Korea ..... *popilliavora*, new species.

Anterior and dorsal margin of the pronotum not separated by a carina; [second intercubitus distinctly curved; produced median portion of clypeus slightly emarginate apically]; Japan and Korea ..... *vernalis*, new species.

Tiphia autumnalis, new species.

This species seems to be more closely allied to *fuscipennis* Smith than to any other of the species described from either Korea or Japan, but it may be separated from Smith's species by having only two carinae on the propodeum. In Malloch's key (Bull. Illinois State Nat. Hist. Surv., vol. 13, art. 1, 1918, p. 7) it runs to *clypeata* Robertson, but it may readily be separated by the darker wings, the much longer propodeal enclosure and the absence of a median carina on the propodeum.

Female.—Length 12 mm. Clypeus flat, surface with large, close punctures, the anterior margin broadly produced medianly and truncate; the base of mandibles with a number of large punctures; head shining, with large, well separated punctures, the interspaces being much wider on the vertex and occiput; dorsal and anterior surfaces of the pronotum separated by a well defined carina, the anterior face shining, with very few punctures, the dorsal surface also shining but with well defined, rather large punctures which are separated by a distance subequal with the width of the punctures; the posterior margin of the pronotum impunctate; scutum with large, well separated punctures; tegulae broader than long and without a surrounding suture; scutellum more sparsely punctured than the scutum; propodeum shining, when highly magnified the dorsal surface is finely granular; enclosure twice as wide anteriorly as posteriorly, median carina wanting except base; posterior face of propodeum finely and indistinctly punctured except along a median line where there are a few large punctures; mesepisternum polished, the greater part of its surface unipunctate but with large punctures posteriorly and some small punctures in the interspaces; sides of the propodeum dorsally with strong longitudinal striae, ventrally polished except posteriorly where it is finely coriaceous; first abdominal segment without transverse carina, the apical margin without a preapical suture, the anterior and dorsal aspects similarly sculptured; abdomen

polished, the first two segments with a few widely scattered punctures, the third, fourth and fifth with punctures successively closer so that on the fifth they become almost contiguous; pygidium coarsely, longitudinally striatopunctate to the apical fourth, where it is smooth and almost without sculpture; sternites with well separated punctures; apical sternite truncate, the punctures closer posteriorly; hind basitarsus without a longitudinal groove; second intercubitus strongly curved; second recurrent received at the apical fourth. Black; body sparsely clothed with white hairs; wings uniformly dark brown; venation almost black.

Type-locality.—Suigen, Korea.

Paratype-locality.—Morioka, Japan.

Described from 29 females (one type) from the type-locality collected in August, 1923, by C. P. Clausen, and from two females from the paratype locality collected August 20, 1920 by C. P. Clausen and recorded under his number 1385. Mr. Clausen states that this species lays its eggs dorsally on the thorax of grubs of species of *Anomala*, but that it successfully attacks the grub of *Popillia japonica*. The experimental work was based on material from Korea.

Type and *paratypes*.—Cat. No. 27092, U. S. N. M.

Tiphia popilliavora, new species.

The female of this species runs to *robertsoni* in Malloch's key, but it may readily be separated from this species by the presence of a carina separating the anterior and dorsal surfaces of the pronotum. The male runs to *vulgaris* or *inornata* under number 19 in Malloch's key but is smaller, the abdomen is more sparsely punctured and the hair on the sixth ventral segment is erect and whitish.

Female.—Length 10 mm. Clypeus flat, basally with large, close punctures, the anterior margin with a broad, low, median projection which is truncate; base of the mandibles shining, with two or three large, poorly defined punctures; head shining, with large, widely separated punctures, the interspaces greater on the vertex; the area immediately above the antennal fossae with small punctures in interspaces; anterior and posterior faces of the pronotum separated by a distinct transverse carina; the anterior surface of the pronotum with rather large punctures and smaller ones in the interspaces, the dorsal aspect sculptured like the frons except the shining impunctate posterior margin; tegulae broader than long, without a surrounding suture or punctures; scutum and scutellum sculptured like pronotum; dorsal aspect of the propodeum shining but basally indistinctly granular; enclosure parallel-sided, two and one-half times as long as broad, with a complete median carina; posterior face of the propodeum granular, a few irregular wrinkles laterally and without a distinct median carina; abdomen shining, polished; preapical depression on the first tergite shallow and with one series of punctures; punctures widely separated on all tergites and sternites but somewhat larger and a little closer on tergites four and five; pygidium longitudinally striatopunctate to the apical fourth which is shining and

under high magnification finely shagreened; apical margin of the hypopygidium rounded, the surface of the hypopygidium subopaque and the punctures somewhat closer than on the preceding segment; hind basitarsus with a longitudinal groove on the inner side; second intercubitus strongly curved; second recurrent received at apical third. Black; body sparsely clothed with white hair, the hair on the sixth sternite erect, rather sparse; hair on the apical margins of the sternites long and erect; wings uniformly dark brown; venation dark brown; stigma black.

Paratype females vary from 9.5 to 10.5 mm. The infuscation of the wings is slightly variable. Certain of the paratypes, especially those from Korea reared from grubs of *Phyllophaga*, have an oblique groove on the sides of the pronotum. This character seems very well marked in certain specimens but in the series is subject to variation and can hardly be considered even of varietal importance.

Male.—Length 7 mm. Clypeus flat, surface with distinct, close punctures, the apical margin distinctly produced medianly and broadly angulately emarginate; frons sparsely punctured medianly, laterally bipunctate, the larger punctures much more widely separated; carina on the anterior margin of the pronotum sharply defined and followed by a transverse sulcus; pronotum with rather small, widely separated punctures; scutum and scutellum with the punctures slightly larger than those on the pronotum; dorsal aspect of the propodeum granular and with a few transverse aciculations; propodeal enclosure one and one-half times as long as broad, parallel-sided with a complete, distinct median carina; a transverse groove in front of the carina which separates the dorsal and posterior aspects; posterior face of the propodeum finely granular and with a few small punctures; first tergite without a transverse carina, with an indistinct preapical depression; abdomen shining, the first two segments very sparsely punctured, the punctures becoming closer on the succeeding segments; all sternites simple; second intercubitus slightly curved anteriorly, the radial and second cubital cells ending at the same point. Black; body sparsely clothed with glistening white hair; wings pale brownish, darker in the radial area; venation brown; stigma black.

Type-locality.—Morioka, Japan.

Paratype-localities.—Koiwai, Japan; Suigen, Korea.

Described from 12 females (one type) and one male from the type-locality collected August 20, 1920, by C. P. Clausen and recorded under his number 1384; from 13 females from Koiwai collected September 1, 1921, by C. P. Clausen; from five females from Suigen collected September 8, 1923, by K. Sota and recorded under Clausen number 5, accompanied by a note stating that they parasitize grubs of *Popillia japonica;* from seven females from Suigen, Korea, collected August 20, 1923, by C. P. Clausen and recorded under his number 3, accompanied by a note stating "parasitic on the grubs of *Phyllophaga* species"; from five females collected at Suigen, Korea, August 26, 1922, by J. L. King; and from three females and six males reared at Riverton, New Jersey, from material imported from Japan in 1922 and recorded under experiment number 4.

This species lays eggs on the venter of the abdomen between the fifth and sixth segments and is the one commonly referred to by the Bureau field workers as the "Japanese Tiphia."

Type, *Allotype* and *Paratypes*.—Cat. No. 27093, U. S. N. M.

Tiphia vernalis, new species.

The female of this species is close to *punctata* Robertson and *robertsoni* Malloch but the wings are darker, the anterior margin of the clypeus is gently emarginate and the posterior face of the propodeum has a median longitudinal carina. The male runs to section 22 in Malloch's key, page 6, and of the species which occur after that it seems to agree better with *conformis* Malloch.

Female.—Length 11 mm. Clypeus slightly convex, produced median portion broad, with a distinct shallow emargination; surface of the clypeus with well separated punctures on the basal two-thirds; base of the mandibles with a few small punctures; head shining, with distinct, well defined punctures which are separated by a distance as great as or greater than the width of the punctures; the area immediately above the antennal fossae with a few small punctures in the interspaces; pronotum without a carina separating the dorsal and anterior aspects; the anterior face with close punctures which in the middle tend to be confluent; dorsal surface of the pronotum with distinct, well separated punctures except on the posterior margin; tegulae broader than long, without punctures and without a surrounding suture; scutum and scutellum with large, widely separated punctures; dorsal aspect of propodeum coriaceous except the smooth posterior lateral portion; median enclosure about twice as long as broad, parallel-sided, with a distinct median carina; a distinct, irregularly foveolate, groove in front of the carina that separates the dorsal and posterior aspects; posterior face of the propodeum coriaceous, more distinctly so below, and with a distinct median carina; mesepisternum with large, well separated punctures except posteriorly, where there are small punctures in the interspaces; sides of the propodeum dorsally with longitudinal striae, ventrally coriaceous and without scattered punctures; hind basitarsus with a longitudinal groove on the inner side; abdomen shining, sparsely punctured, the punctures becoming closer on the apical segments, always separated by a distance greater than the width of the puncture; first tergite without a transverse carina, the preapical groove distinct and with a double row of punctures; pygidium longitudinally striato-punctate to apical fifth which is smooth and apparently without sculpture; hypopygidium truncate apically, rather closely punctured. Black; body sparsely clothed with long white hair which is denser on the apical margins of the sternites and tergites; the hair on the sixth ventral segment slightly recumbent; wings dark brown; venation black; second intercubitus strongly curved.

Male.—Length 7.5 mm. Clypeus flat, the anterior median portion strongly produced, the apical margin with a distinct, angulate emargination; frons shining, with large, distinct punctures which along the eye margins are separated by less than the width of a puncture and in the middle portion are separated by a distance two or three times as great as the diameter of the punctures; vertex punctured like the median portion of the frons; dorsal and anterior surfaces of the pronotum separated by a distinct transverse carina; dorsal aspect

of the pronotum polished, with a few widely separated punctures; tegulae without a surrounding suture or punctures; scutum and scutellum punctured similar to pronotum; dorsal aspect of the propodeum granular, the propodeal enclosure but little longer than wide, very slightly narrowing posteriorly, with a distinct, complete median carina; posterior face of the propodeum coriaceous with a distinct median carina; abdomen polished, with widely separated punctures, the apical segments punctured almost as sparsely as the basal ones. Black; sparsely clothed with white hair; wings hyaline, apically infumated beyond the basal vein; venation dark brown, stigma black; second intercubitus curved so the second cubital cell is longer on the radius; radial cell distinctly exceeding the second cubital cell.

Type-locality.—Suigen, Korea.

Paratype-locality.—Oiso, Japan.

Described from 20 females (one type) and 7 males from the type-locality collected by J. L. King. The type and allotype were collected in coitu and are mounted on the same pin. Fifteen of the females were used in experiments by Mr. King and are recorded under his numbers 10, 11, 12, 13, 18, 19, 24, 27, 30, 31, 32, 33, 40, 41, 42, 43. All of these females oviposited in the larvae of *Popillia japonica* with the exception of that under number 10. Some of the females laid as many as ten eggs, others as few as two. Dates of collection range from April 19 to May 25, the type and allotype having been collected on May 23, 1922. Also described from one female and four males from Oiso, Japan, collected April 21, 1921, by C. P. Clausen and recorded under his number 1597. This species lays the eggs ventrally between the third thoracic and first abdominal segment, the head end being away from the median line.

Type, *Allotype* and *Paratype*.—Cat. No. 27094, U. S. N. M.

CHANGE OF A PREOCCUPIED GENERIC NAME.

By A. N. Caudell.

Through the kindness of Prof. C. P. Alexander I have learned that the name *Galloisia*, erected by me on page 53 of the present volume of this journal for a new genus of Notoptera, is preoccupied, having been used in Coleoptera by Hustache in Bull. Mus. Paris, 920, p. 493. I therefore here propose **Galloisiana** for the notopterous genus.

Actual date of publication, April 21, 1924.

BIRTHDAY GREETINGS, DOCTOR SCHWARZ.

On April 21st the Honorary President of the Society, Dr. E. A. Schwarz, celebrates his eightieth birthday. The Society takes this occasion to express its great affection for him and its admiration for his character and learning, and to wish him many happy birthdays. May he remain long with us and continue to inspire our meetings.

The following paragraph from a paper read by Doctor Howard at the twenty-fifth anniversary meeting of the Society in January, 1909 (Proc. Ent. Soc. Wash., vol. XI, 1909, p. 12) may well be quoted here; for what was then said holds as true to-day.

"Years ago B. Pickman Mann once said to me, 'The principal reason for the existence of the Entomological Society is E. A. Schwarz.' Is it not true? What an indifferent meeting it would be without him! There are volumes upon volumes of entomological knowledge packed away in his brain, and with tables of contents and elaborate indices prepared for instant use. This unexampled store of entomological information is always at hand and ready for use in our discussions—is always ready to be imparted in the kindliest and most humanistic spirit to every worker. We should perhaps paraphrase Mann's saying, and put it thus: What has made the Entomological Society valuable to us beyond all other organizations has been the constant presence and participation in its discussions of Eugene A. Schwarz * * *."

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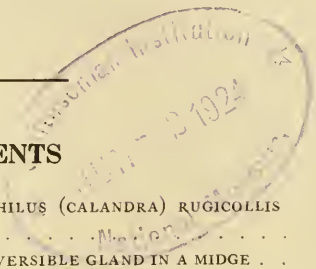

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NEW SPECIES OF PYRALIDAE OF THE SUBFAMILY NYMPHULINAE FROM TROPICAL AMERICA (LEPID.).

By W. Schaus.

This paper is a continuation of several which have appeared in the Proceedings of the Entomological Society of Washington describing new species of Pyralidae in the National Museum. Most of the specimens were collected by Barnes and Schaus, a few have been in the collection for many years and are from unknown or indefinite localities. The paratypes from the Cornell Expedition have been generously presented to the Museum by the University. The Museum is also indebted to Mr. P. Dognin of France for several species new to the collection.

Argyractis maronialis, new species.

Male.—Palpi white, laterally hair brown; throat, pectus, abdomen below and legs white, the fore femora and fore tibiae above hair brown, a black ring on basal joint of fore tarsi; head white; abdomen above with vinaceous buff segmental bands. Fore wings silvery white; base hair brown widest on costa, its outer edge inbent, straight; a similar antemedial patch on costa, its outer edge outbent; a postmedial triangular spot with its apex across discocellular; a subterminal fascia widest on costa, narrowing towards tornus; the antemedial spot followed below in cell by a broad antimony yellow shade to inner margin which is continued below vein 2 to termen, interrupted on inner margin by a slight white postmedial line, and at tornus by an oblique silvery white streak; termen antimony yellow, its inner edge finely fuscous; cilia silvery white. Hind wing white at base; medial antimony yellow fascia from within cell to inner margin, broadly interrupted on submedian fold, containing a few black scales on inner margin; a broad iridescent bar beyond cell and a similar streak below vein 2 to termen; outer area antimony yellow; three velvety black spots on termen partly edged with white and iridescent scales, surmounted by irregular black markings, the line above uppermost spot on a small white space; cilia from apex to vein 2 hair brown at base then white. Fore wing below with costal half hair brown to beyond cell with a whitish line on discocellular, the subterminal fascia as above. Hind wing below cream color the inner margin broadly white, the terminal spots as above.

Expanse, 14 mm.

Habitat.—St. Jean, Maroni River, French Guiana.
Type.—Cat. No. 26918 U. S. N. M.
Can be placed near *C. aealis* Walker.

Argyractis cathanalis, new species.

Male.—Palpi and head white; thorax whitish buff, abdomen above light drab, the basal segment white, body below white; legs whitish, the fore tibiae streaked with brown, the fore tarsi light cinnamon drab with fuscous spots on first and last joints. Fore wing silvery white; a subbasal and broad antemedial buffy brown spot on costa; a fine similar medial line from costa to below cell, followed by a paler brown shade to the buffy brown postmedial which is outbent and bifurcates from vein 7 to vein 5, the inner branch edging the naples yellow discocellular line which is also dark edged proximally; the yellow discocellular line is continued by a similar fascia to the terminal band above tornus; an erect medial naples yellow line on inner margin emitting a similar line at vein 2 to the fascia from discocellular; a subterminal buffy brown fascia from costa narrowing to a point at vein 3; terminal band naples yellow proximally edged by a fuscous line; a darker silver streak above inner margin at tornus; cilia on inner margin naples yellow, on termen silver white with dark shading at apex. Hind wing silvery white at base and along inner margin; a faint small brownish spot at anal angle; a naples yellow fascia across middle of cell followed by a silver bar extending below cell, the postmedial area naples yellow except a narrow dull white space before the spots; three small black marginal spots edged with iridescent scaling except distally, surmounted by black and suffusing with a terminal black line; cilia beyond spots wood brown tipped with white. Hind wing below with the spots reduced, the scaling silvery instead of iridescent, the terminal line silver.

Expanse, 11 mm.

Habitat.—Guapiles, Costa Rica.
Type.—Cat. No. 26919 U. S. N. M.
Nearest *A. maronialis* Schaus.

Argyractis maguilalis, new species.

Female.—Palpi white on inner side, outwardly drab; head, thorax and abdomen white, the latter with dorsal transverse yellow buff lines. Fore wing white; an elongated fuscous triangular streak on costa beyond base; a broad transverse snuff brown fascia, slightly inbent, partly suffused with ochraceous buff, becoming antimony yellow on inner margin; an antimony yellow streak on discocellular, its brown lines on either side suffusing with a broad snuff brown patch on costa; a medial brown spot at cell with a light buff streak from it touching the end of subterminal at vein 3 and the marginal band at submedian fold; subterminal band snuff brown narrowing to vein 3, its end suffused with antimony yellow, followed by a broad silvery white line to fold; marginal band warm buff with a black line on proximal edge; a light buff spot on inner margin postmedially surmounted by a silver streak to tornus; cilia silvery gray suffused with black at base. Hind wing silvery white on basal half; an antimony yellow fascia across cell to inner margin, followed by a silver streak; postmedial space from costa to below vein 2 light cadmium, slightly white adjoining spots; three small marginal black spots with iridescent scaling between them, suffusing with an interrupted terminal black line and surmounted by some black lines.

Expanse, 13 mm.

Habitat.—St. Jean, French Guiana.
Type.—Cat. No. 26920 U. S. N. M.

Argyractis bedealis, new species.

Female.—Palpi, head and body white, the second segment of abdomen above with subdorsal cinnamon brown spots; legs white. Fore wing white; basal half of costa narrowly bister; a medial inbent sayal brown fascia suffused with yellow on inner margin; a fine parallel interrupted line beyond it, mostly obsolescent, edging the postmedial on costa, as a fine line below cell from which a yellow fascia is outbent suffusing with discocellular, is down bent on upper edge, touches the terminal point of subterminal and the marginal band just above tornus, it then continues as a fine yellow line to inner margin; a postmedial yellow streak along inner margin to a small silver oblique streak near tornus; a postmedial sayal brown spot on costa suffusing with discocellular yellow oblique line which is edged by sayal brown lines; subterminal fascia sayal brown on costa, below it yellow distally edged by a fuscous line; marginal band yellow proximally edged by a fuscous line and with a dark point at apex; cilia silvery gray. Hind wing white; a fine erect brown line above anal angle; a yellow fascia across middle of cell followed by a silver bar before discocellular; outer space yellow downbent to termen below spots, before spots narrowly dull white; three irregular spots, suffusing with short terminal black streaks and surmounted by detached and irregular black markings; iridescent and silvery clusters of scales between the spots and those surmounting them; cilia with a dark line at base below the spots; underside with the spots reduced and very irregular.

Expanse, 12 mm.

Habitat.—Pernambuco, Brazil.
Type.—Cat. No. 26921 U. S. N. M.

Argyractis aroalis, new species.

Female.—Body and wings white; fore tibiae and tarsi streaked with hair brown, abdomen above with faint brownish segmental lines and subdorsal black points on second segment. Fore wing: costa suffused with wood brown to post medial line which is also wood brown, outbent from costa to vein 4 tapering to a point; an inbent antemedial thick wood brown line interrupted below cell; two fine oblique lines at discocellular; a subterminal line similar to postmedial but straighter, broad on costa tapering to a point at vein 2; a cream color line from middle of inner margin to cell, then along vein 2 to the yellow terminal line, the inner edge of which is finely fuscous from above tornus to vein 7; a silver terminal streak along submedian fold; cilia white. Hind wing white; a cream buff patch at end of cell followed by some silvery white scaling and a vertical cream buff line from vein 7 to vein 2; three black terminal spots and a fourth smaller spot separated by metallic amaranth pink scaling and surmounted by small black lunules, also a cream buff line above them from vein 7 to vein 2. Fore wing below with the markings of costal half fainter. Hind wing below entirely white with the terminal spots reduced.

Expanse, 17 mm.

Habitat.—Aroa, Venezuela.
Type.—Cat. No. 26922 U. S. N. M.

Comes nearest *A. aclistalis* Dyar which has the apical area of hind wing suffused with naples yellow.

Argyractis aztecalis, new species.

Male.—Palpi brown in front, white behind. Head white, collar, thorax and abdomen above light ochraceous buff with fine brownish lines on dorsum and patagia; abdomen below cream color; fore tarsi fuscous with white rings. Fore wing: basal half wood brown, towards inner margin whitish irrorated with brown, followed by a white line which is silvery from subcostal to inner margin, continuing in cell to the discocellular oblique naples yellow bar which is edged on either side with some brown scaling; area beyond below cell and vein 4 naples yellow with a postmedial silvery spot above inner margin and a similar streak from vein 4 near cell to near termen and tornus; costa above discocellular cream color; a wood brown postmedial line, proximally broadly shaded opposite cell somewhat sinuous and retracted at vein 4 to discocellular patch, enclosing some silvery white scaling, also outwardly edged with silvery white from costa to vein 4; a subterminal wood brown line inwardly edged with naples yellow and outwardly by a silvery white line, expanding inwardly at vein 2 and fold; a terminal naples yellow line inwardly edged by a fine fuscous line; cilia silvery. Hind wing costa to beyond middle narrowly, inner margin broadly and cell basally white, otherwise chiefly naples yellow; antemedial brown irrorations below cell and a streak near inner margin; an iridescent bar beyond cell; a terminal white space from vein 7 to below vein 5 with three small black spots, surmounted by a wavy black line; termen with iridescent scaling from vein 7 to below vein 2; cilia white. Hind wing below silvery cream color, the terminal spots reduced to paired streaks.

Expanse, 19 mm.

Habitat.—Jalapa, Mexico.
Type.—Cat. No. 26923 U. S. N. M.
Allied to *A. mignonalis* Dyar.

Argyractis esperanzalis, new species.

Female.—Palpi wood brown. Head, collar and thorax white, the latter with a few minute dark scales. Abdomen above thickly irrorated with brownish buff scales, partly metallic leaving white segmental lines. Body below silvery white; fore tibiae and tarsi buff in front. Fore wing: base whitish broadly shaded on costa with wood brown, limited by a silvery white line; a medial brown spot on costa; a white streak in cell; the white discocellular line with some brown on either side; postmedial and subterminal lines broad on costa tapering and converging to vein 3, the space between silvery white and a similar white line before the terminal naples yellow line, the latter inwardly edged by a fine fuscous line; outer half of wing below cell and vein 3 naples yellow containing a large silver spot above inner margin and a curved silver line from near base of vein 3 to inner margin near tornus; cilia silvery. Hind wing: costa for two-thirds, base and inner margin broadly shining white; a few dark scales near inner margin, also in end and below end of cell; an iridescent discal bar followed

by naples yellow from vein 8 to vein 2, and again by an iridescent line; terminal area dull white crossed by a naples yellow finely dentate line, with four black spots surrounded by iridescent scales and surmounted by a lunular black line; the second spot from apex really a continuation of the black lines inbent and expanding on termen; cilia white with a brown line near apex.

Expanse, 16 mm.

Habitat.—Esperanza, Costa Rica.
Type.—Cat. No. 26924 U. S. N. M.
Closely allied to *A. triumphalis* Schaus which differs in the terminal spots of hind wing and has the preceding yellow space opaque and closely approaching the spots.

Argyractis valstanalis, new species.

Female.—Palpi avellaneous; head and body white, the abdomen above partly suffused with buff brown bands; body below and legs white, the fore tibiae and tarsi avellaneous, the tarsi with black spots. Fore wing: the costa wood brown; basal half with some buffy brown irrorations to a similar medial line outangled at vein 2; an oblique white discocellular line with brown lines on either side; the medial line followed below vein 2 by a silvery white line and then by a yellowish line forming a semicircle to inner margin near tornus containing silvery scales within and above it; postmedial line remote, snuff brown, outcurved below costa to vein 5, sinuous and faintly retracted near vein 2 towards cell above a yellowish line from discocellular along vein 2, followed by a thick white line from costa to vein 2; subterminal snuff brown on costa and rather broad, below vein 6 yellow proximally followed by a thick silvery white line; marginal band primuline yellow with a fuscous line distally; cilia smoky white with some dark shading. Hind wing silvery white; some light buff shading along inner margin and a small brown subterminal spot before inner margin; a pale yellow spot beyond lower angle of cell to vein 2 followed by a double silver line filled in with pale yellow, the outer line reaching termen; a fine subterminal ochraceous line above the spots; three heart shaped marginal spots followed by silvery golden terminal spots, each spot surmounted by a detached black line, doubly dentate over each spot.

Expanse, 35 mm.

Habitat.—Merida, Venezuela.
Type.—Cat. No. 26925 U. S. N. M.
Near *A. auspicatalis* Schaus.

Argyractis schwarzalis, new species.

Female.—Body above wood brown; back of head, collar medially except in front, and patagia except shoulders white. Body below and legs cream color, the fore tarsi with brown rings. Fore wing: costa broadly suffused with avellaneous; cell and space below chiefly white irrorated with wood brown; a medial wood brown line outcurved on costa and slightly inbent to inner margin; postmedial line narrow but suffusing proximally with costal shade, slightly oblique to vein 2, angled and retracted to discocellular, down and outbent to inner margin postmedially; subterminal cinnamon, very broad on costa, narrowing to

submedian fold, suffused from below vein 4 with naples yellow, inwardly edged by a white line, outwardly by a fine fuscous line and then by silvery white; terminal line naples yellow edged on both sides by a fine fuscous line; a yellow streak below postmedial where retracted to discocellular; a dark silver spot on inner margin at tornus; cilia silvery with a black spot at tornus. Hind wing white at base and on inner margin; some silver scales and a small yellow spot at tornus; a yellow patch beyond cell between veins 6 and 2 followed by an iridescent line which continues below vein 2, is followed by yellow and a second iridescent line; postmedial area above vein 3 naples yellow expanding to apex and containing two white spots, one below vein 5, the other between veins 6 and 7; subterminal space dull white followed by five black spots separated by a fine lunular black line.

Expanse, 22 mm.

Habitat.—Trece Aguas, Alta Vera Paz, Guatemala.
Type.—Cat. No. 26926 U. S. N. M.
Collected by Dr. E. A. Schwarz and Mr. Barber.

Argyractis chejelalis, new species.

Female.—Body above cream color; collar and patagia shaded with cinnamon buff; abdomen with dorsal and subdorsal dark brown irrorations on basal half, the terminal segments cinnamon with white bands posteriorly, body below and legs white, the fore tarsi with pinkish buff and brown spots. Fore wing: base to a medial white vertical line suffused with clay color on costa and in cell, below cell whitish with buff suffusions and some dark irrorations forming an outcurved antemedial shade; medial line followed by a clay color spot on costa, then antimony yellow to the postmedial line; outer half of cell clay color, the discocellular with a white line edged on either side with antimony yellow; postmedial broad on costa terminating in a point at vein 3, its proximal side toothed towards discocellular with white lines on either side; a thick subterminal cinnamon line to near tornus, its outer edge fuscous followed by a white line; terminal line antimony yellow edged on inner side with fuscous; space beyond medial line below cell and vein 3 antimony yellow with a silvery white postmedial spot on inner margin and an oblique silvery white streak from vein 2 to inner margin before tornus; cilia silvery white. Hind wing: base and inner margin from below cell white with some cream color and brown irrorations before the margin; space beyond cell antimony yellow crossed by two iridescent bars between veins 6 and 2, its outer edge finely dentate with a small white spot below vein 6, then followed by white to the spots; three terminal black spots with iridescent scaling chiefly on termen surmounted by a black lunular line expanding to termen between the first and second spots from apex; cilia white with a fuscous line near base from apex to vein 2. Hind wing below with the spots fainter and cut by veins.

Expanse 21 mm.

Habitat.—Chejel, Guatemala.
Type.—Cat. No. 26927 U. S. N. M.

Argyractis tamanalis, new species.

Female.—Palpi white with some fuscous hairs at base; frons white with a medial brown line; collar and thorax olive brown, the patagia edged with white; abdomen above buffy brown, darker shaded dorsally. Body below and legs ochraceous buff. Fore wing: base white limited by a subbasal snuff brown line oblique from costa, then whitish thickly irrorated with snuff brown especially at medial line; medial line white broadly expanding outwardly just below cell; postmedial space snuff brown; discocellular line white, oblique; postmedial line white, outbent from costa to vein 3, curved and retracted to discocellular line, then down and outbent to inner margin, where retracted to cell and downbent the space is filled with antimony yellow and with a similar subterminal spot on inner margin; subterminal line bister, very broad on costa, narrow below vein 5 with some yellowish scaling, followed from below apex to below vein 2 by a white line, then inbent and dark silvery to postmedial; termen antimony yellow proximally edged with fuscous and with terminal black spots; cilia silvery with a basal fuscous line. Hind wing white: some fuscous scaling in and below end of cell, also above anal angle; a postmedial yellowish bar edged with fuscous from vein 6 to below vein 2; apex with a yellow line edged with black; four small black spots on margin broadly edged with iridescent scales, then above and between them with black and a proximal lunular yellow line inwardly edged with fuscous. Wings below with the markings partly visible in transparency, the terminal black spots on hind wing much reduced.

Expanse, 24 mm.

Habitat.—Juntas del Rio Tamana and Rio San Juan, W. Colombia.

Type.—Cat. No. 26928 U. S. N. M.

Argyractis ulfridalis, new species.

Male.—Head and thorax buffy brown; lateral white lines on frons. Fore wing buffy brown with traces of a darker antemedial line; a fine medial white line inbent from costa to inner margin; a yellow bar on discocellular with fuscous lines on either side, suffusing with a yellow streak from below cell to subterminal; postmedial line defined by white on outer side from costa to vein 3; subterminal broad on costa, suffused with yellowish, terminating at vein 3 on the longitudinal streak, outwardly edged by a white line; terminal band yellow suffusing at tornus with a similar streak on inner margin and above this latter an interrupted fine silvery streak; cilia silvery. Hind wing white, the inner margin broadly silky gray with some darker scaling above anal angle; a golden brownish spot at middle and below middle of cell; a brownish spot in end of cell followed by a short white bar; a broad and irregular postmedial fascia reaching the lowest marginal spot; three large black terminal spots, the lowest spot completely surrounded with iridescent scaling, the other two only laterally and terminally; the middle spot surmounted by two coalescing smaller black spots, the first and third by a curved black line; cilia grayish white with some fuscous mottling at apex. Underneath the spots are black on a white ground.

Expanse, 11 mm.

Habitat.—Dominica, West Indies.

Type.—Cat. No. 26929 U. S. N. M.

Argyractis rinconadalis, new species.

Female.—Palpi ochraceous laterally streaked with wood brown; frons wood brown, some white on vertex; collar and thorax white, the former in front and shoulders bone brown; abdomen dorsally clay color, the base white and some bone brown scaling on second segment. Body below white; fore and mid legs buff, the fore tarsi with fuscous spot, the hind legs white. Fore wing white; basal half of costa bister followed by a yellow ocher streak to postmedial line which is outbent, narrow, suffusing at vein 3 with the subterminal which is broader, inbent along vein 2 and 3 to a transverse medial band which is inbent below cell, all these markings bister; a faint whitish line between the postmedial and subterminal above vein 3 becoming yellow ocher on costa; a silvery white band from costa near apex following the subterminal; apex bister, below it a yellow ocher band, finely edged on either side with fuscous, shortly inbent at tornus on inner margin, where it is preceded by a short vertical bister line; cilia silvery white. Hind wing white; a broad antemedial bister fascia; a fine brown line across cell to below origin of vein 2; termen dark silvery gray to a yellow patch at anal angle, surmounted by a metallic bronze shade, three small black spots between veins 5 and just above vein 6; apex yellow ocher preceded by two short and fine brown lines. Hind wing below white with the spots replaced by three small clusters of black scales.

Expanse, 23 mm.

Habitat.—Rinconada, Mexico.
Type.—Cat. No. 26930 U. S. N. M.
Somewhat like *A. catenalis* Gueneé.

Argyractis lucianalis, new species.

Female.—Palpi wood brown; frons white suffused with yellow, two brown points in front; collar white with some yellow lateral scaling; thorax wood brown, the patagia with large white spots; abdomen above clay color mottled with bister at base. Body below white; legs white, the fore legs and mid tibiae streaked with cinnamon buff. Fore wing white; basal half of costa bister connected with inner margin by a subbasal bister fascia; a medial outcurved fascia proximally bister, distally snuff brown expanding to end of cell and between veins 2 and 3 to postmedial line; postmedial line bister from costa to vein 3 preceded on costa by a yellow ocher streak and followed by a similar spot and below this latter by a short white line, at discal fold it suffuses with the subterminal line; subterminal broad on costa and rapidly narrowing, bister, near vein 3 suffusing with a yellow ocher streak from cell between veins 3 and 2, followed from costa to vein 3 by a silvery white band; terminal band yellow ocher inwardly edged by a fine black line; a silver streak terminally on fold above a small yellow ocher spot; cilia silvery, the base fuscous. Hind wing white; an antemedial sayal brown fascia from within cell to inner margin; a similar line across cell, downbent and expanding near inner margin above a small yellow spot; a fine bister lunular dentate line from costa near apex to vein 3 near cell; four marginal black spots broadly edged with iridescent scales on termen, and surmounted by a lunular black line; apex yellow ocher. Hind wing: below with black marginal points on veins 3, 5, 6 and one between 5 and 6.

Expanse, 23 mm.

Habitat.—Juan Vinas, Costa Rica.
Type.—Cat. No. 26931 U. S. N. M.
Nearest *A. rinconadalis* Schaus.

Argyractis gontranalis, new species.

Female.—Head, thorax and abdomen pinkish buff, underneath cream color, the legs pinkish buff. Fore wing white; costa from base to medial line snuff brown followed by a darker brown spot and a warm buff streak to postmedial; base below costa ochraceous buff with subbasal clusters of bister scales below cell and vein 1; medial line fine, snuff brown slightly outcurved, bister irrorations from it to end of cell, below cell to postmedial, and a few below vein I forming a short vertical line; discocellular white bar defined by a pale yellowish line on its outer edge; postmedial line snuff brown outbent to vein 3, almost touching the slightly broader subterminal line which is connected with a yellowish streak from cell between veins 2 and 3; subterminal followed by a silvery band inbent below fold and vein 1; a terminal antimony yellow band inwardly edged from below vein 7 by a fine black line and with a black point at apex; cilia silvery with fuscous spots at base. Hind wing white; an antemedial brownish spot in and below cell; a brownish lunule across cell with a few black scales on it, continuing as a medial snuff brown line downbent and thickly angled postmedially, then upcurved to inner margin near angle; a lunule of fine black scales on discocellular and another above it; an irregular postmedial line of black and bister scales from vein 7 to vein 3 and a few scattered black scales beyond it; four black spots on margin surmounted by a lunular black line and a very faint yellowish tinge; termen iridescent gold expanding slightly between the spots; apex narrowly antimony yellow; cilia white.

Expanse, 24 mm.

Habitat.—Orizaba, Mexico.
Type.—Cat. No. 26932 U. S. N. M.
Allied to *A. nitens* Schaus.

Argyractis aengusalis, new species.

Male.—Palpi brown with a white line above; head and thorax sepia, the frons white; abdomen above avellaneous, the basal segment white, underneath white. Fore wing white; costal margin sepia suffusing with the postmedial line; base of cell sepia; a short subbasal brownish line not reaching inner margin; an antemedial yellowish fascia expanding at subcostal; an outangled white medial line on costa, outwardly edged by a fuscous line and incurved to inner margin emitting line below cell and a straight line on vein 1 forming an oval postmedial spot with white center; discocellular oblique, white, edged on either side with sepia and followed by a small white spot; postmedial slightly outbent from costa to vein 4; subterminal band yellow buff, almost vertical retracted at vein 2 to discocellular; marginal band yellow buff, separated from postmedial by a white line and suffusing with it at vein 2, both lines partly edged with black along white interspace; an outbent yellow buff line from vein 2 to tornus; cilia white with fuscous shade at base. Hind wing white; an antemedial brownish fascia across cell; a medial yellow buff line, outangled below vein 2, then incurved end-

ing in a brownish spot at anal angle; a semiovate postmedial line from below costa to vein 2, crossed by a short line dividing the white center into two spots; four marginal black spots completely surrounded by iridescent scaling and surmounted by a thick black lunular line. Fore wing below almost entirely fuscous except terminally. Hind wing below white; costa fuscous; subterminal semiovate line present; terminal spots reduced, the scaling around spots silvery.

Expanse, 12 mm.

Habitat.—Rio de Janeiro, Brazil.
Type.—Cat. No. 26933 U. S. N. M.

Argyractis alemundalis, new species.

Female.—Palpi whitish laterally streaked with brown. Abdomen above avellaneous with dark segmental lines, underneath white. Fore wing white suffused with light buff and irrorated with black; a fine subbasal black line; a fine outcurved antemedial yellowish line with clusters of black scales; a medial black line slightly outcurved on costa then vertical to inner margin; postmedial line fine, black, outbent to vein 3, then retracted and upcurved to cell and outbent as a curved line to inner margin near tornus; subterminal buffy brown, broad on costa, its outer edge straight, terminating in a point at vein 3, preceded and followed by clear white, the white inbent below vein 3 to within retracted portion of postmedial; terminal band yellow edged proximally by a fine black line preceded on inner margin by a small dull silver spot and yellowish line; discocellular line white, dark edged, rather indistinct; cilia silvery with black spots at base. Hind wing silky white at base with subbasal fuscous shading and an antemedial blackish shade from within cell to close to inner margin; a quadrate yellow ocher spot medially followed by a fine double black line filled in with silver, the space beyond opaque, cream color irrorated with black; four marginal round black spots followed on termen by smaller spots and lines with iridescent scales between them; a lunular yellow line edges the spots proximally and is then finely edged with black. Wings below largely suffused with fuscous, the spots on hind wing reduced and surmounted only by a fine lunular black line.

Expanse, 13 mm.

Habitat.—Peralta, Costa Rica.
Type.—Cat. No. 26934 U. S. N. M.
Nearest *A. serapionalis* Schaus.

Argyractis serapionalis, new species.

Female.—Head and thorax snuff brown; abdomen buffy brown above with darker segmental lines; abdomen below and legs avellaneous, the fore legs streaked with snuff brown. Fore wing suffused with buffy and cinnamon brown; a fuscous dentate antemedial line; a fine black medial line outcurved below costa and again below submedian fold; postmedial line fine, black outangled beyond cell, then incurved and minutely dentate on costal half crossing a whitish shade thickly irrorated with cinnamon brown; subterminal broad on costa, bister, below vein 6 sayal brown, at vein 3 retracted to postmedial; terminal band sayal brown edged with black on either side, preceded by a dull silvery line, intersected at fold; cilia dull silvery alternating with black. Hind

wing: base brownish, a large subbasal fuscous patch below cell to near inner margin followed by a white antemedial fascia; a large sayal brown patch in and below end of cell, outwardly edged by a black line, with another sayal brown and black spot below it reaching anal angle; a medial white line beyond discal patch followed by a fuscous line; outer area dull white irrorated with fuscous black; four marginal round black spots, with an interrupted terminal narrow black band and iridescent scales between them, surmounted by a lunular fuscous black line; a yellowish tinge on termen near anal angle; cilia brownish at base then silvery white.

Expanse, 15 mm.

Habitat.—Cayuga, Guatemala.
Type.—Cat. No. 26935 U. S. N. M.
Near *A. plusialis* Herrich-Schaeffer.

Argyractis psalmoidalis, new species.

Female.—Body above benzo brown, the base of abdomen white; body below whitish, the legs light drab. Fore wing benzo brown without any distinct markings on basal two-thirds; a white bar from below costa on outer side of discocellular, outbent to vein 3 and irregularly upcurved to near apex along the terminal band, a short sinuous benzo brown line crossing it at the curve; a marginal olive ocher band proximally edged by a fine black line with some golden points on it from below vein 5, at vein 2 retracted to cell, and between veins 5 and 2 there is a benzo brown fascia preceding it; a short terminal gold streak on submedian fold; cilia white with a black line at base. Hind wing white suffused with drab; inner margin with antemedial and terminal fuscous markings; cell two-thirds the length of wing; a medial fuscous spot in cell, beyond it a dark line downbent and curved to termen near anal angle followed by a white fascia which crosses end of cell and stops near termen below vein 2; outer space between veins 2 and 5 white, thickly irrorated with drab; a fine subterminal dark line from costa to vein 4; four small black marginal spots completely edged with iridescent scales and fine dark drab lines. Fore wing below with the white markings reduced. Hind wing below suffused with drab except a triangular white space from termen with its apex in cell; marginal spots smaller, partly double.

Expanse, 16 mm.

Habitat.—Baracoa, Cuba.
Type.—Cat. No. 26936 U. S. N. M.
Quite unlike any described species.

Argyractis malcusalis, new species.

Female.—Body white, fore wing white; costa wood brown, a darker antemedial spot distally edged with whitish; a medial whitish streak and whitish triangular spot beyond postmedial; space below cell to medial line with some avellaneous irrorations; an inbent medial fascia to inner margin; an inbent white line on discocellular and a white streak beyond it crossed by a fine dentate short black line; postmedial outbent to vein 3 followed by a narrow whitish shade; subterminal band wood brown retracted between veins 2 and 3 to cell, the space below it white with some fuscous irrorations; terminal band warm buff inwardly

edged by a fine black line and preceded by silvery white to vein 2; cilia silvery white with a fine dark line at base. Hind wing white, a few dark scales at anal angle; a silver bar across end of cell with yellow bars on either side; two fine dark brown postmedial lines from costa to vein 3, at costa wavy, with a third line above first marginal spot which becomes thick and extends to termen between the first and second spots; the three spots finely edged with iridescent scales, the second and third surmounted by thick black lunules; cilia white crossed by a dark line near base from apex to vein 2. Hind wing below white, the marginal spots reduced, the postmedial lines broken.

Expanse, 12 mm.

Habitat.—St. Domingo, West Indies.
Type.—Cat. No. 26937 U. S. N. M.
Allied to *A. schistopalis* Hampson.

Argyractis climacusalis, new species.

Female.—Palpi and head wood brown; collar and thorax white; abdomen above drab gray with brown dorsal spots on three basal segments and transverse brown shading on following two segments. Body below and legs whitish, the fore tibiae streaked with wood brown, the fore tarsi fuscous with whitish rings. Fore wing white, the costal margin mostly sepia; an antemedial white bar on costa; a medial white line on costa defined proximally below it to inner margin by a broad sepia shade with some similar irroration on antemedial space, and on distal side by a sepia line to within cell; an oblique white bar on discocellular with sepia lines on either side; postmedial line oblique to vein 3 outwardly defined by a white line; subterminal line sepia, broad on costa narrowing to a point at vein 2, also followed by a white line; terminal line buff yellow with a black line on inner edge and terminal black points; from near middle of inner margin an upcurved yellow fascia to postmedial at vein 2, from it an oblique yellow line to tornus; cilia silvery gray. Hind wing shining white; some fuscous scaling above anal angle and in cell, the latter followed by a discocellular yellow bar, then by iridescent silver scaling and a postmedial yellow line with silver distally, this latter line vertical from vein 6 to near termen below vein 2; three marginal spots and a black point followed by golden iridescent scales on termen, edged above by a silver line surmounted by a lunular dentate black line; a triangular white patch before the spots crossed by a fine sepia line. Hind wing below with the spots reduced to paired streaks with silver scaling on termen.

Expanse, 20 mm.

Habitat.—Tiguri, Carabaya, Peru.
Type.—Cat. No. 26938 U. S. N. M.

Argyractis zamoralis, new species.

Female.—Palpi avellaneous; head buff white, cilia and thorax bister with some white mottling, the tips of patagia white; abdomen above buff white with segmental bister lines becoming broader towards base, obsolescent terminally. Body below white, the fore tarsi white with brown bands. Fore wing: costa and markings mostly snuff brown; a white spot below costa followed by a subbasal snuff brown line, the antemedial space below cell whitish with some brown

irrorations; medial space snuff brown to inner margin followed by a fine white line on costa and cell, below cell broader; an oblique white line on discocellular, and a white line from it to postmedial at vein 3; postmedial defined by a broad silver white line distally, preceding the subterminal which is partly suffused with tawny olive, outwardly edged by a black line, and at vein 2 is retracted to cell as a cinnamon buff line; marginal band yellowish inwardly edged with black preceded by a silvery white line, outwardly with small golden spots; on postmedial space a semicircular cinnamon buff line edged above with silvery white and containing a similar spot; a cinnamon buff line at tornus with a silver streak above it. Hind wing white; snuff brown scales in cell and on inner margin from base to anal angle; a cinnamon buff line across middle and one across discocellular with iridescent scaling between and beyond; costa apically buffish between veins 7 and 6 with snuff brown mottling and a wavy dark subterminal line across a white patch; three marginal black spots and a black point terminally edged with iridescent scales, proximally with silver, the latter surmounted by a dentate black line. Underneath the spots at veins 3 and 5 are paired with a little silver scaling on termen.

Expanse, 25 mm.

Habitat.—Zamora, Ecuador.
Type.—Cat. No. 26939 U. S. N. M.

Received from Mr. Dognin who has a co-type. Closely allied to *A. climacusalis* Schaus.

Argyractis lulesalis, new species.

Male.—Head and body white, the abdomen above with cinnamon buff bands; body below and legs white, the first joint of fore tarsi with a black spot. Fore wing pinkish buff, the costa suffused with drab becoming fuscous at base; postmedial space in and below cell to inner margin with dark irrorations; a few antemedial irrorations almost forming a line; a fuscous medial vertical line; a faint yellowish oblique bar on discocellular; an outbent fuscous postmedial line distally finely edged with white; subterminal triangular space warm buff below vein 7, followed by a white line; terminal band warm buff inwardly edged by a black line, retracted above submedian fold to near cell; a white spot and oblique buff line above inner margin at tornus; cilia white with black shade at base. Hind wings white; a cluster of fuscous scales near inner margin above anal angle; a warm buff bar with a few dark scales across middle of cell, a second bar clear warm buff before end of cell, and a third after discocellular, this last bar downbent to termen and reaching veins 7–8; four terminal iridescent annuli with black centers and laterally edged with black almost meeting on proximal side; subterminal space from vein 2 to costa cream color irrorated with black.

Expanse, 15 mm.

Habitat.—Lules, Tucuman, Argentine Republic.
Type.—Cat. No. 26940 U. S. N. M.

Argyractis laurentialis, new species.

Female.—Palpi white, head, collar and patagia light ochraceous buff, the thorax bister; abdomen above drab; the second and part of third segment sepia,

a dorsal sepia spot on last segment. Body below and legs white, the fore legs streaked with drab. Fore wing: base sepia followed by an antemedial slightly inbent white line from subcostal, the latter with an orange spot on its outer edge from below cell to inner margin; some sepia above the spot to subcostal; costa medially light buff; a white medial line blurred towards inner margin; postmedial area sepia limited by a blackish oblique line to vein 5 and a thick white line following it to vein 4, below them an oblique orange band suffusing with the subterminal at vein 4 and with the terminal band on discal fold; subterminal broad on costa, proximally orange, distally raw sienna to vein 5, then edged with black to below vein 2; marginal band orange inwardly edged with black preceded by a thick silvery white line; the postmedial sepia space above inner margin limited by an oblique silvery line from near base of vein 3 to a small orange spot on inner margin before tornus; a small silver spot at tornus; cilia dark silvery shaded with black. Hind wing: base and inner margin silvery white; a vertical subbasal sepia line from cell to inner margin; an orange antemedial line, downbent below cell to termen and expanding at anal angle, preceded close to inner margin by an oval sepia spot containing iridescent scales, followed by an iridescent line which crosses cell before its end; space beyond fuscous; a large round white spot on postmedial area from vein 6 to vein 2; four marginal black spots defined by lateral iridescent scaling suffusing with a terminal black line interrupted by orange points; cilia white suffused with smoky black. Underside with the markings of outer half duller and reduced.

Expanse, 15 mm.

Habitat.—St. Laurent, Maroni River, French Guiana.

Type.—Cat. No. 26941 U. S. N. M.

Allied to *Cataclysta alvealis* Felder which is probably also an *Argyractis*.

Argyractis castusalis, new species.

Female,—Palpi, head and thorax hair brown; abdomen above ochraceous tawny with whitish transverse bands irrorated with fuscous except on two basal segments; body below and legs light drab. Fore wing whitish suffused and irrorated with buffy brown forming subbasal and a broad antemedial shade, the latter followed by a fine whitish medial line outwardly dark edged; postmedial space light buff on costa, white in and below cell, limited by a fine dark remote fuscous line outcurved from costa, curved above vein 2 and retracted to discocellular, then downbent to inner margin, outwardly edged by a faint whitish line; subterminal fuscous parallel with postmedial line to vein 3 preceded by a fine whitish line, followed by a slightly wider white line; termen fuscous; cilia grayish with a fuscous line at base. Hind wing whitish irrorated with buffy brown, forming a shade across middle of cell, expanding and downbent on inner margin followed throughout by a clear white shade and a medial brown line outangled below vein 2, and there followed by clear white space to termen; four minute black marginal spots followed by paired silver spots on a fine terminal fuscous line; cilia white crossed by a fuscous line from apex to anal angle. Hind wing below white irrorated with brown except on inner margin; the spots as above.

Expanse, 22 mm.

Habitat.—Jalapa, Mexico.
Type.—Cat. No. 26942 U. S. N. M.
Not like any described species.

Argyractis tapajosalis, new species.

Female.—Body and wings white; collar medially snuff brown; abdomen above with sepia segmental lines only distinct on second and last segment. Fore wing; costa with patches of snuff brown irrorations separated by the ground color and forming in part the commencement of lines; an oblique streak at base of costa; a subbasal curved line to inner margin; an antemedial patch extending slightly below cell; an outcurved medial line followed by irrorations in and beyond cell to postmedial line, interrupted on discocellular by a white lunule edged with bister; postmedial line bister incurved below costa, only reaching vein 3; a subterminal snuff brown line very fine between veins 3 and 2, inangled on submedian fold; a narrow terminal antimony yellow band edged by a fuscous black line proximally; cilia white with a black spot at apex. Hind wing: a fine wavy medial line from discocellular to inner margin at angle; a large postmedial snuff brown patch from vein 7 to vein 2, continuing below vein 2 as a fine line to termen near angle; a subterminal fine line from costa suffusing with the postmedial patch; a narrow terminal yellow line preceded by some silver scaling between veins 7 and 2, with black points on it at veins 3, 5 and 6. Hind wing below white with only the three black points.

Expanse, 20 mm.

Habitat.—Rio Tapajos, Amazon, Brazil.
Type.—Cat. No. 26999 U. S. N. M.
Received from Mr. Dognin.

Argyractis dodalis, new species.

Female.—Palpi, head and thorax white, also two basal segments of abdomen which is otherwise maize yellow with fine fuscous segmental lines; body below silvery white. Fore wing creamy white; the costa cream color; a fuscous basal point, antemedial spot on costa, and a fine fuscous medial line followed by a silver streak below costa; edged below with fuscous which is upcurved to costa; terminal space maize yellow crossed by a thick subterminal silver line partly edged with fuscous; cilia white. Hind wing white at base, then maize yellow, a wavy antemedial fuscous line and a similar irregular postmedial line; a marginal silver line cut by some minute black points; a fine dark terminal line. Wings below whitish, the outer markings visible in transparency, the hind wing with only the black marginal points on veins 2, 3, 5 and 6.

Expanse, 13 mm.

Habitat.—Tumatumari River, British Guiana.
Type.—Cat. No. 27029 U. S. N. M.

Argyractis gordianalis, new species.

Female.—Head cartridge buff; collar and thorax white, the patagia tipped with cartridge buff; abdomen white above, a fuscous band on second segment and light buff bands on following segments; anal hairs fuscous. Fore wing:

costal margin white with tawny markings not extending below cell; inner margin to cell and vein 3 cream color with a small white spot at tornus; a broad subbasal and antemedial spot; an elongated spot from middle to postmedial line which is oblique to vein 4 edging a white line on discocellular which is also dark edged proximally; a subterminal wedge shaped spot from costa to vein 3; a cream color terminal line partly edged inwardly by some dark scaling; cilia light buff at base with traces of a hair brown line, the tips white. Hind wing: base and inner margin white; a buff yellow antemedial spot in cell and slightly below it, with a dark point at its lower angle, and followed by a silver and golden bar; postmedial space suffused with cream color; two large terminal, irregular black spots, streaked with iridescent scales; cilia cream color, at base adjoining spots hair brown. Fore wing below with costal markings to postmedial suffusing. Hind wing below white, the terminal spots broken by irregular white lines.

Expanse, 9 mm.

Habitat.—Rio Puramaya, Peru; Rio Solimoes, Brazil.
Type.—In Cornell University.
Paratype.—Cat. No. 27105 U. S. N. M.
Collected by the Cornell University Expedition.

Argyractis odoalis, new species.

Female.—Body and wings white; a dorsal hair brown patch at base of abdomen and faint drab gray lines on following segments, on anal segment cinnamon drab. Fore wing: base of costa benzo brown and a similar antemedial fascia, its outer edge angled on costa, narrower at vein 1, on inner margin maize yellow; medial line very fine, dark, close to antemedial on costa, outangled in cell, on inner margin maize yellow; a postmedial elongated benzo brown spot on costal margin; a warm buff oblique line on discocellular edged by two benzo brown lines; a subterminal fascia, verona brown on costa below vein 6 cinnamon, narrowing to a point at vein 2, a maize yellow band from its end to medial line; terminal band maize yellow from below costa inwardly edged by a black line to vein 2, inbent slightly below 2 and then preceded by a small grayish silver spot; a black point at apex; cilia white, at base dark silvery gray. Hind wing: a broad antemedial warm buff fascia from within cell, interrupted before inner margin where it is reduced to a narrow line, followed in and below cell by silvery scaling, and a fine vertical punctiform dark line; postmedial space mostly cream color becoming white before terminal markings; three small iridescent jasper pink spots edged with short black lines and points, surmounted by a fine broken black line and with terminal yellow points between them; cilia hair brown at base, the tips broadly white. Fore wing below with the costal markings mostly suffusing, the inner margin broadly white. Hind wing below white; the termen silver with black points.

Expanse, 10 mm.

Habitat.—Mouth of Rio Teffé; Rio Solimoes, Brazil.
Type.—In Cornell University.
Paratype.—Cat. No. 27104 U. S. N. M.
Collected by the Cornell University Expedition.

Argyractis benezetalis, new species.

Female.—Body white, the abdomen dorsally with faint ecru transverse lines, the line on second segment mikado brown. Wings white, the markings mostly warm buff. Fore wing: a subbasal black spot on costa emitting a short line into cell; a curved antemedial line suffused with fuscous from costa to vein 1; a parallel medial line suffused with fuscous on costa, followed by a curved line below costa and connected with medial line on inner margin by a small yellow buff shade; postmedial line single on costa, double below subcostal, dark edged, outbent, retracted between veins 2 and 3 to lower angle of cell, then outbent to inner margin before tornus; a subterminal excurved narrow fascia from costa to vein 4; a terminal band inwardly edged by a black line from vein 7 and inbent on vein 2, outwardly edged by a broken black line; cilia light buff. Hind wing: a broken antemedial line; a fine medial line across cell; traces of a postmedial line, retracted at vein 3 to cell and downbent; a subterminal line, partly fuscous; a terminal band inwardly edged by a black line and crossed proximally by a thick silver line, outwardly edged by a black line; cilia whitish. The termen indentate below vein 6. Fore wing below with the markings broader, mostly smoky fuscous.

Expanse, 10 mm.

Habitat.—Mouth of Rio Teffé, Rio Solimoes, Brazil.
Type.—In Cornell University.
Paratype.—Cat. No. 27103 U. S. N. M.
Collected by the Cornell University Expedition.

Argyractis conallalis, new species.

Female.—Head and thorax army brown; a white spot laterally on collar; abdomen with first segment ochraceous, second segment army brown, third segment white, the two following segments tawny. Fore wing: base army brown; an antemedial inbent white fascia expanding on inner margin; costa medially grayish; outer half of cell tawny, the space below army brown; a black line on discocellular edged with white; a cuneiform subterminal tawny patch from costa, edged with white, an ochraceous buff line inbent from it at submedian fold; a terminal narrow tawny fascia with a black line on inner edge. Hind wing: base white; a broad medial ochraceous buff fascia crossed by a blackish and iridescent line, its outer edge above vein 5 black expanding to near apex on costa, followed by a white crescent before the spots; two large black terminal spots with iridescent scaling, a white point between them and another white point near the apex which is narrowly ochraceous buff, a light buff point on termen between the spots.

Expanse, 10 mm.

Habitat.—British Guiana.
Type.—Cat. No. 27102 U. S. N. M.

Nymphula avertinalis, new species.

Male.—Palpi, head and body avellaneous, the terminal half of abdomen above slightly darker shaded, the anal tuft partly white. Fore wing avellaneous; a medial white line from subcostal to below vein 1 edged on either

side with cinnamon brown; a fine postmedial fuscous line, slightly outbent from costa, sharply inbent below vein 4; small faint smoky marginal spots on interspaces. Hind wing white on basal half, crossed by an antemedial and a medial avellaneous line; beyond medial line and below vein 5 the postmedial space white above vein 5 and on termen suffused with avellaneous. Hind wing below white irrorated with avellaneous on costa and termen, the lines as above; fuscous marginal points on interspaces.

Expanse, 13 mm.

Habitat.—Baracoa, Cuba.
Type.—Cat. No. 27000 U. S. N. M.

Cataclysta azadasalis, new species.

Male.—Palpi wood brown; body white, the abdomen with fuscous segmental lines; hind tibiae and base of tarsi with long hair brown tufts. Fore wing white; a broad subbasal mikado brown fascia edged with black followed by a faint fuscous line from within cell, and an antemedial fine black line, slightly inbent; medial space with a fine black streak above subcostal, a long ovate line in cell followed by black points, and clusters of black scales above submedian fold and on inner margin; the discocellular defined by a fine dentate black line on its outer edge, inangled at vein 2, outbent and twice lunular inbent along vein 1, ending in isolated black scales at middle of inner margin; a bister postmedial fascia from costa, partly suffused with cinnamon, outbent to inner margin before tornus, followed from below vein 2 by a dark silver spot; subterminal fascia orange buff, wide on costa, narrowing to vein 2, a black line on its outer edge; marginal band orange buff, finely edged with black and with a black spot at apex; the space on either side of subterminal silvery white; cilia black. Hind wing white crossed by irregular black lines; a fuscous patch at base; antemedial line to inner margin; medial line double, below costa united by a black line on median, then obsolescent; two postmedial lines; termen black, its proximal edge irregular, broken partly into spots by iridescent scaling and four small terminal orange buff spots; cilia drab tipped with silvery white. Hind wing below as above, the termen with four small black spots defined by silver.

Expanse, 12 mm.

Habitat.—Rockstone, Essequebo River, British Guiana.
Type.—Cat. No. 27001 U. S. N. M.
Near *C. sumptuosalis* Möschler.

Cataclysta mangholdalis, new species.

Male.—Head buffy brown; collar and thorax silvery gray; abdomen above whitish buff on three basal segments, the following segments light drab with lateral silvery white tufts, the anal segments hair brown with white tufts. Fore wing white with basal and subbasal hair brown suffusions; a fuscous antemedial line, somewhat macular, followed by a fine streak and small fuscous spot in cell and three longitudinal lines between cell and inner margin; discocellular defined by two fuscous lines, the inner line almost vertical to inner margin and outangled on vein 1; a postmedial ochraceous orange and tawny fascia outbent from costa and joined by a bar with a browner subterminal cuneiform fascia between

veins 3 and 4 slightly retracted, angled and oblique to tornus; a terminal ochraceous fascia with a fine black line on inner edge; a silver gray spot above tornus; cilia silvery gray shaded with black at base. Hind wing white; an antemedial black fascia, followed by an outcurved black line on costa and some streaks medially; two postmedial dentate black lines; four terminal black spots with golden points between and partially on them; terminal orange points between them; cilia white mottled with black.

Expanse, 10 mm.

Habitat.—Zaruma, Ecuador.

Type.—Cat. No. 27106 U. S. N. M.

Collected by F. W. Rohwer. Allied to *C. azadasalis* Schaus, which has the line from discocellular outbent and lunular dentate.

Cataclysta phocosalis, new species.

Female.—Head, body and wings white; some yellow scaling on basal segment of abdomen. Fore wing: a buff yellow spot at base; a subbasal buff yellow line inbent from costa where it is conjoined with the similar broader and outcurved antemedial line, the latter having some fuscous scales on its outer edge in cell and above fold; a double buff yellow medial line diverging above cell, and still more so below cell marked with fuscous scaling except on costa and inner margin where the lines are connected by a yellow streak; discocellular buff yellow edged on either side with fuscous followed by a fuscous V shaped mark from subcostal and vein 8 to vein 3; a buff yellow subterminal band edged by fuscous lines from vein 8 to vein 2 there diverging, one branch retracted to discocellular, the other incurved to tornus; a marginal fuscous line; termen narrowly cream white; cilia white. Hind wing: an antemedial, broad medial and narrower subterminal fascia edged with fuscous, the antemedial only outwardly so edged, the postmedial expanding towards inner margin and there largely filled in with white, the postmedial outbent on costa to the terminal buff yellow band; a few terminal black points below apex.

Expanse, 27 mm.

Habitat.—Peru.

Type.—Cat. No. 27030 U. S. N. M.

Cataclysta anicitalis, new species.

Male.—Head and body above dresden brown, the patagia silvery white; some white shading on abdomen beyond middle; body below white; legs whitish, the femora light buff. Fore wing: the costal margin, a subbasal broad line; a medial fascia, an outcurved postmedial fascia, a subterminal fascia incurved from apex to near discocellular dresden brown; some ochraceous tawny suffusion on costa above discocellular and on medial and postmedial within cell; base narrowly white; a large antemedial white spot from cell to inner margin; a similar spot, somewhat oblique between medial and postmedial line, these lines suffusing from costa to vein 2; a faint yellowish line on discocellular distally edged with fuscous followed by white points at veins 7 and 5; postmedial followed by white points at fold and on inner margin, and a small triangular

yellow ocher spot beyond them to tornus with a silver line above it at tornus; marginal band yellow ocher proximally edged by a black line from vein 8 to vein 2, preceded by a large triangular white spot; cilia silvery white. Hind wing white; a dresden brown medial fascia from subcostal to inner margin with a yellow ocher round spot on it at subcostal, followed by a broad silver space crossed by an incurved yellow line, upbent at vein 1 to medial fascia; outer area irrorated with coarse black scales; termen yellow ocher with 5 black spots, each containing a few iridescent scales; cilia white. Hind wing below with the spots cut obliquely by iridescent scaling.

Expanse, 11 mm.

Habitat.—Santiago, Cuba.
Type.—Cat. No. 27002 U. S. N. M.
Allied to *C. miralis* Möschler which is much whiter.

Cataclysta bronachalis, new species.

Male.—Palpi and head yellow ocher; thorax bister, patagia white; abdomen above dresden brown, the basal segment yellow ocher. Body below white, the legs mostly white, the fore tarsi buffish with black rings. Fore wing: a black spot on base of costa, the costal margin otherwise mostly suffused with yellow ocher; base below costa ochraceous buff limited by an inbent antemedial line from subcostal where it is also outbent to median fascia close below cell, enclosing an ochraceous buff spot in cell; medial fascia sepia, slightly inbent proximally, curved below subcostal and postmedially to inner margin enclosing a large white almost perfectly round spot; antemedial space also white; a small ochraceous buff spot above discocellular, continuing as a fine line on outer edge of it, then widening and outbent above vein 2 to the similar marginal band finely edged with black; a triangular black spot from below costa with linear apex at vein 2 and marginal band divides the white outer space into two spots, one oval, oblique from beyond cell, the other long and narrow before marginal band; an ochraceous buff spot at tornus with an oblique silver line above it and a small white spot on inner margin before it. Hind wing silky white; a medial brown fascia inwardly edged with sepia, and with an outangled ochraceous buff spot on it at end of cell, followed by silver scaling and a postmedial ochraceous buff broad line connected by a fine line with the spot on medial fascia, and by a broader line with the fascia well below vein 2; the postmedial outwardly edged with silver; subterminal space dull white irrorated with black; four small marginal spots with a few iridescent scales on and between them; a terminal ochraceous buff line, slightly expanding between the spots; cilia white. Markings below much reduced.

Expanse, 13 mm.

Habitat.—Cuba or Porto Rico.
Type.—Cat. No. 27004 U. S. N. M.
Belongs to the same group as *C. anicitalis* Schaus.

Ambia elphegalis, new species.

Male.—Palpi white; head white with a medial pale pinkish buff line; neck and front of thorax orange buff, thorax otherwise and collar white; abdomen cream

color with orange buff segmental bands, the basal segment white; traces of black scaling on terminal half. Fore wing: base narrowly ochraceous buff; a subbasal black line distally white edged followed by a black fascia, distally edged with white from below cell and a fine black line; medial space olive lake with some black scaling on inner margin; a whitish dark edged discocellular line; postmedial line whitish edged with fuscous distally beyond cell, almost vertical from costa inbent below discocellular to vein 2 and faintly outbent to inner margin; terminal space mummy brown crossed by a faintly lunular subterminal white line distally edged with black; cilia whitish gray with a fine light buff line at base followed by a thicker black line. Hind wing cream color, the costa, the postmedial space to vein 4, and termen to below vein 2 mummy brown; a subbasal ochraceous orange line; a similar antemedial fascia shaded with fuscous in cell and on inner margin; a lunular dark line on discocellular, followed by a whitish spot; postmedial line fuscous to vein 4 then ochraceous orange to inner margin followed by a similar shade from vein 4 to inner margin; a subterminal whitish line from below costa to vein 5, interrupted and continued towards anal angle.

Expanse, 12 mm.

Habitat.—Essequebo River, British Guiana.
Type.—Cat. No. 27006 U. S. N. M.
Near *Ambia flavalis* Warren.

Ambia marconalis, new species.

Male.—Palpi avellaneous; head white; collar and thorax white crossed in front by narrow ochraceous orange bands; abdomen above buckthorn brown with white segmental lines, underneath the white lines broader. Fore wing ochraceous orange separated into fasciae by the white markings, costal edge blackish to medial line, then whitish mostly; base chiefly ochraceous orange with a white point at base, and an antemedial narrow white line joined by a white streak in cell; medial line fine, expanding and inbent below cell, edged with black, followed on costa by a white fovea; a white lunule distally black on discocellular followed by white streaks beyond cell, above vein 6 and above vein 7, latter longer than the streak above vein 6; a postmedial white line curved and slightly inbent between veins 2 and 3, edged with black; a subterminal line expanding somewhat above tornus retracted below vein 2, then broader and downbent to inner margin postmedially; at submedian fold the black edging of lines is connected by a small black bar; the medial ochraceous orange space on inner margin is partly suffused with fuscous; cilia silver shading to black. Hind wing: a narrow subbasal and a broad antemedial white fascia; the medial ochraceous orange fascia partly suffused with black, its outer edge outcurved from costa to below vein 3, again outcurved near inner margin with a white pot on it at discocellular; the subterminal ochraceous orange band retracted on vein 2 to medial fascia; the white line preceding the terminal band constricted at discal fold and vein 2 where it is crossed by a blackish shade.

Expanse, 20 mm.

Habitat.—Yahuarmayo, Peru.
Type.—Cat. No. 27007 U. S. N. M.

Allied to *A. jonesalis* Schaus which has the postmedial and subterminal white markings of hind wing expanding into spots.

Ambia asaphalis, new species.

Female.—Body wood brown; collar and edges of patagia white, abdomen with vinaceous buff segmental bands; abdomen below white with wood brown segmental bands. Wings white, the markings chiefly yellow ocher finely edged with black. Fore wing: a broad inbent antemedial fascia, its proximal edge rather heavily shaded with black; medial fascia vertical, its proximal edge outcurved to cell, its outer edge formed below cell by the fine black postmedial line which is outcurved and retracted at vein 4 along median, in cell the medial fascia is distally edged by a white discocellular lunule edged with black; the space within postmedial below costa is crossed by a broad yellow ocher streak, and there is similar shading along the postmedial; a broad subterminal fascia curved and inbent at vein 2, its edging suffusing with the postmedial at vein 2 and cell, below vein 2 it is downturned and narrower to inner margin suffusing with the marginal fascia which is shortly inbent on inner margin, and does not extend above vein 8, the white line preceding the marginal fascia is crossed on vein 8 by a yellow ocher streak. Hind wing: a narrow antemedial fascia expanding into a round spot in cell; a medial fascia, its proximal edge almost straight from subcostal, its distal edge formed by a postmedial line retracted at vein 4 to cell enclosing a large white space beyond a black discocellular lunule; subterminal fascia curved and retracted on inner edge to medial fascia below vein 2, then again outcurved; a marginal band.

Expanse, 16 mm.

Habitat.—Tiguri, Carabaya, Peru.
Type.—Cat. No. 27008 U. S. N. M.
Allied to *A. marconalis* Schaus and *A. jonesalis* Schaus.

Ambia arnoulalis, new species.

Male.—Body light pinkish cinnamon, some black irrorations on abdomen. Wings thickly suffused with mikado and snuff brown. Fore wing: a curved subbasal whitish line irrorated with black; a white antemedial line outangled in cell, then inbent and expanding on inner margin; a slight swelling on costal edge medially; a thick white postmedial line inbent from costa to vein 2, inset, broader and outbent to inner margin; a subterminal black line parallel with termen preceded by some fuscous irrorations; termen clear sayal brown; cilia black tipped with white. Hind wing: an antemedial white fascia; a postmedial line, white from costa to vein 5 and on inner margin, the intermediate portion thickly irrorated with black; a faint subterminal black line parallel with termen.

Expanse, 18 mm.

Habitat.—Jalapa, Mexico.
Type.—Cat. No. 27009 U. S. N. M.
Allied to *A. symphorasalis* Schaus, the two species standing by themselves.

Ambia symphorasalis, new species.

Female.—Palpi white; head and body above tawny olive, underneath cinnamon buff with segmental white lines ventrally; legs whitish buff. Fore wing tawny olive, the markings white; a line from subcostal near middle strongly inbent and expanding to inner margin; a streak from discocellular to subterminal line which is deeply outcurved and inbent to inner margin postmedially, finely edged with hair brown scales, preceded from vein 4 to inner margin by some orange cinnamon shading; a marginal narrow whitish line edged with hair brown scaling, the termen narrowly ochraceous buff; cilia silvery gray. Hind wing to postmedial line suffused with mikado brown; a little white at base; an antemedial white fascia edged with fuscous; a black point at end of cell; a postmedial white line deeply outcurved beyond cell, distally finely edged with black, proximally preceded by some snuff brown scaling; terminal space ochraceous buff, divided by a white line edged with black; cilia hair brown; the apex produced at vein 7. Wings below with the markings reduced.

Expanse, 18 mm.

Habitat.—Chejel, Guatemala.
Type.—Cat. No. 27010 U. S. N. M.

Ambia cilianalis, new species.

Male.—Palpi, head and thorax white, the patagia with two brown spots and tipped with light cadmium. Abdomen white, with light cadmium transverse bands except on basal segment; abdomen below light buff with segmental lines. Wings white, the markings mostly light cadmium. Fore wing: subbasal black points on subcostal and median, the latter followed by a small light cadmium spot and another black point; an antemedial fascia outangled below cell followed by a parallel medial fascia angled below vein 2; a broad postmedial fascia outbent, suffusing with a subterminal band above vein 2 and with an elongated spot on inner margin, this latter also suffusing with the narrow terminal band; a fuscous oblique streak on postmedial at discocellular, this fascia followed by a triangular spot resting on costa, its apex at vein 4; all the markings finely edged with black. Hind wing: a broad antemedial, medial and postmedial fascia, somewhat sinuous; a narrow terminal band suffusing with postmedial at anal angle, a few black and white points on it between veins 3 and 6. Hind wing below white, the fascia seen in transparency; no terminal band.

Expanse, 14 mm.

Habitat.—Geldersland, Surinam.
Type.—Cat. No. 27011 U. S. N. M.

Ambia cantiusalis, new species.

Female.—Head and body white; two pale orange yellow lines on collar and one across patagia, similar lines on abdomen above. Wings white, the markings chiefly light orange yellow. Fore wing: a subbasal and a broader antemedial line; a fine fuscous outcurved medial line connected with postmedial by an orange yellow bar on vein 1; a small spot in end of cell; an incurved fuscous lunule containing a white line; postmedial line fine, fuscous, curved from vein 5 to lower end of cell, then erect to inner margin, the curve from vein 5 filled in

with pale orange yellow to cell, and a similar streak on veins 6 and 7, a small spot on costa above it; a subterminal band edged with black, parallel with postmedial to near end of cell; a terminal band inwardly edged by a fine black line upcurved at vein 1 to subterminal. Hind wing; an antemedial broad line; medial fascia broad on costa, its proximal edge straight, its discal edge finely black upcurved from vein 4 to vein 2, becoming narrower to inner margin, a white space on it from within cell to its outer edge, the discocellular line remaining pale orange yellow; subterminal and terminal lines sinuous, parallel, partly edged with black and suffusing at apex and anal angle; cilia white with smoky mottling at apex, vein 4 and below vein 2.

Expanse, 15 mm.

Habitat.—Col. Perene, Peru.
Type.—In Cornell University
Paratype.—Cat. No. 27107 U. S. N. M.
Near *A. dendalis* Druce. Collected by the Cornell University Expedition.

Parambia cedroalis, new species.

Female.—Palpi whitish with pale avellaneous tips to joints, head, collar and thorax white; abdomen above fuscous black, the basal segment white with subdorsal fuscous points, the others with fine white segmental lines; body below and legs avellaneous, the fore tarsi with whitish rings. Fore wing: base white expanding to middle of costa, limited by a fine oblique black line from inner margin to subcostal, continued as a fine brownish line outangled on costa, the costa beyond creamy white; the space beyond from subcostal to inner margin drab gray thickly irrorated with chaetura drab and with cinnamon brown shading along the black line; a fine white outcurved line from costa before apex, becoming terminal at vein 3 with black points at vein 2 and submedian fold; the apex creamy white; cilia drab. Hind wing: costal half white, the lower half drab; a black medial spot below vein 2 extending to inner margin, with another spot below it on inner margin; a fine postmedial white line from vein 4 to inner margin above angle followed by black scaling from below vein 3; some terminal drab shading to apex; a terminal white line with black points on interspaces, and a line near angle. Hind wing below avellaneous, the termen narrowly white with short black lines on interspaces.

Expanse, 12 mm.

Habitat.—Alto del Cedro, near Santiago, Cuba.
Type.—Cat. No. 27012 U. S. N. M.
Allied to *P. glenealis* Dyar.

Oligostigma odrianalis, new species.

Male.—Body above drab, some white on collar behind; the patagia posteriorly, a small dorsal spot on metathorax and the third segment of abdomen white; body below and legs white. Fore wing snuff brown, the costal margin broadly suffused to outer line with pale ochraceous buff; outer line white, remote, parallel with termen from costa to vein 4 then gradually expanding and incurved to inner margin, followed by a snuff brown narrow band parallel throughout with

termen, then a fine white line and the terminal antimony yellow band, the latter edged with black more heavily proximally; inner margin terminally antimony yellow; cilia grayish. Hind wing white; a point at base, a subbasal fascia and a postmedial fascia snuff brown, the latter from the marginal antimony yellow band below costa to near inner margin where the marginal band is upbent along it; the marginal band edged with black, the outer edging forming below apex three triangles filled in with white; cilia with a fine black line near base.

Expanse, 21 mm.

Habitat.—Sao Paulo, S. E. Brazil.

Type.—Cat. No. 27013 U. S. N. M.

Allied closely to *O. juncealis* Guenée; vein 4 and 5 on hind wing midway from cell, in *juncealis* they diverge close to termen. All our specimens of *O. juncealis* are from French Guiana and are considerably larger than the figure in Guenée's Pyralites, and also have in the male a distinct swelling at the base of costa.

Oligostigma andeclalis, new species.

Female.—Palpi and head tilleul buff; body above drab, the abdomen with transverse fuscous black bands. Fore wing: base light cinnamon drab; a basal black spot on costa; subbasal and antemedial blackish lines, the space limited by a more pronounced black line outcurved on costa, slightly inbent from within cell to inner margin; medial and costal space within postmedial saccardo's umber; postmedial line almost vertical from costa to vein 4, retracted around the whitish discocellular and downbent to inner margin, followed throughout by a narrow whitish shade and then by a parallel wood brown shade slightly suffused with ochraceous on costa; terminal band antimony yellow proximally edged by a black line preceded by a thick white line; cilia fuscous at base. Hind wing whitish; an antemedial broad medial and a postmedial saccardo's umber fascia, the medial not reaching costa; a terminal antimony yellow band proxmally edged by a black line, terminally with black points on interspaces. Hind wing below with the fascia narrower.

Expanse, 16 mm.

Habitat.—Castro, Parana, Brazil.

Type.—Cat. No. 27015 U. S. N. M.

The palpi have the third joint angled back against frons.

Aulacodes congallalis, new species.

Female.—Body and wings bone brown, the abdomen with dorsal segmental lines, the wings with white lines. Fore wing: antemedial line fine, outcurved; median line vertical from costa, outbent from fold to inner margin; postmedial very faint, retracted from vein 3 to the whitish discocellular and downcurved; subterminal line broader from costa to vein 5, and near tornus; cilia black at base. Hind wing: a fine antemedial and postmedial line; the subterminal distinct near apex and anal angle.

Expanse, 13 mm.

Habitat.—Cayuga, Guatemala.

Type.—Cat. No. 27015 U. S. N. M.
Nearest *A. obtusalis* Dyar.

Aulacodes julittalis, new species.

Female.—Palpi bister tipped with white; frons white with a medial bister streak; body bister, the patagia tipped with white, the second segment of abdomen mottled with white and a white band on last segment; body below silvery white, the segments of abdomen with tawny olive bands. Fore wing bister; costal edge mostly white; a fine white antemedial line almost vertical; a fine white medial line, outbent to median, below it more oblique but almost obsolete, followed in cell by a sayal brown patch; a fine white postmedial line vertical on costa, oblique on discocellular to vein 3, then upcurved to costal margin, but slightly inbent at vein 7 and emitting a short white streak bent towards discocellular; a subterminal dentate white line distally edged with sayal brown; termen narrowly pinkish buff with a fine terminal bister line; cilia snuff brown and white crossed by a dark line. Hind wing bister; medial space white from below costa to near inner margin, preceded and followed by a fine white line from costa to inner margin; termen narrowly mottled with white and pinkish buff; an interrupted terminal bister line; cilia with a bister line very faint towards anal angle.

Expanse, 13 mm.

Habitat.—Alhajuelo, Panama.
Type.—Cat. No. 27016 U. S. N. M.
Collected by A. Busck.

Aulacodes nissenalis, new species.

Female.—Body white; a tawny olive point on vertex, line on shoulders and faint dorsal spots on abdomen, the latter with a dorsal and subdorsal points on basal segments, a fuscous black band on second segment and subdorsal black points on next to last segment. Wings white, the markings fine, tawny olive. Fore wing: a point at base of costa; a subbasal oblique line on costa and point beyond in cell, also a point below it on vein 1; an antemedial line from cell to inner margin; a large annulus in cell, and on discocellular; a medial lunule below cell and short streak on vein 1; postmedial streaks on veins 3, 4, 5, 6 and discal fold, followed by a line inangled above vein 5, inbent below vein 2; subterminal and terminal lines. Hind wing: antemedial and medial wavy lines, a line between them in cell; postmedial line deeply incurved below vein 6 and again below vein 2, preceded by streaks on veins 3 and 4; a postmedial line from costa to below vein 2; a terminal line; cilia white crossed by a smoky line.

Expanse, 19 mm.

Habitat.—Callao, Peru.
Type.—Cat. No. 27017 U. S. N. M.
Received from Mrs. M. J. Pusey. Allied to *A. citronalis* Druce.

Aulacodes fiachnalis, new species.

Female.—Body chaetura drab; abdominal segments with faint whitish segmental lines, the basal segment with some white points. Wings hair brown.

Fore wing: darker irrorations forming indistinct subbasal and antemedial bands, partly interrupted; a faint very fine whitish medial line, outcurved on costa, with dark scaling distally from cell to inner margin; postmedial line fine, but more distinct, incurved on costa, then outcurved, slightly inangled at vein 2; marginal black points, almost forming a line from near apex to submedian fold; a very fine terminal dark line and two similar lines at base of grayish cilia which are also tipped with black from apex to submedian fold, below which the cilia are whitish; the apex is slightly produced. Hind wing: costa whitish, the hair brown scaling linear; medial space from vein 5 to below vein 2 chaetura drab limited by a whitish postmedial line which does not reach margin; a fine marginal black line from vein 7 to below vein 2; a faint terminal line; cilia as on fore wing. Wings below with inner margins broadly whitish.

Expanse, 11 mm.

Habitat.—Alhajuelo, Panama.
Type.—Cat. No. 27018 U. S. N. M.
Collected by A. Busck.

Aulacodes grimbaldalis, new species.

Female.—Palpi, head and basal segment of abdomen white, body above otherwise cinnamon buff with some white on collar behind and white segmental lines; body below silvery white. Fore wing cinnamon buff; a basal and antemedial whitish fascia; slightly darker medial and postmedial lines, the former evenly curved with some whitish proximally, the latter parallel, but slightly incurved below vein 2 with whitish distally; small marginal white spots above veins 7 and 8, and a terminal black point on submedian fold; cilia silvery cinnamon buff. Hind wing: base silvery white crossed by an antemedial cinnamon buff shade from cell to inner margin, connected with medial line by a narrow similar shade below vein 2; the medial line not reaching costa edged distally with white; space beyond cinnamon buff; a terminal black point below vein 2 and a white line from above it to anal angle; cilia cinnamon buff tipped with white.

Expanse, 11 mm.

Habitat.—Cayuga, Guatemala.
Type.—Cat. No. 27019 U. S. N. M.

Aulacodes odulphalis, new species.

Female.—Palpi white; head and body above warm buff slightly darker on patagia; some white dorsally on basal segment of abdomen; body below light buff. Fore wing whitish, the veins warm buff to outer line, the medial and postmedial space irrorated with hair brown scales; subbasal, antemedial and medial warm buff spots on costa with faint traces of lines; a hair brown oblique streak on discocellular; outer line close to subterminal, warm buff on costa, black from vein 7 to vein 2, slightly incurved and inangled below fold; subterminal line warm buff, faint and parallel below vein 2 with outer line preceded and followed by white especially on distal side; a fine terminal broken black line; cilia with basal golden tipped with white and separated by a very fine blackish line. Hind wing: base, costal and inner margins silvery white; the outer space warm

buff; a medial band from below costa of hair brown irrorations with tufts of long hair brown scales to near anal angle; a blackish postmedial line, upcurved below vein 2 and downbent to anal angle; a similar subterminal line with silvery scales distally; termen from vein 5 to vein 2 with broad ochraceous orange spots across veins distally edged with black and with paired black points on interspaces; from vein 5 to costa a fine terminal black line; cilia silvery white.

Expanse, 13 mm.

Habitat.—Cayuga, Guatemala.
Type.—Cat. No. 27020 U. S. N. M.
Near *A. calistoalis* Walker.

Aulacodes adjutrealis, new species.

Male.—Body white; base of palpi hair brown; a fuscous black line across front of collar, and one across front of thorax; fuscous segmental lines on abdomen above. Wings white the lines fuscous black. Fore wing: streaks from base above subcostal, in cell, below median upbent from near base of inner margin, and a shorter streak more remote from base upbent and along vein 1, followed by a fine line outbent on costa and well outcurved below it; a fine line just beyond middle slightly outbent and straight from costa to inner margin, followed by a black edged buckthorn brown fascia, bifurcating near inner margin, the proximal band narrower and vertical, the distal band shortly outbent and upturned as a fuscous black line to costa, the enclosed white space containing a U shaped line; a subterminal line not reaching costa; an interrupted finer terminal line; cilia light buff at base followed by a smoky shade and white tips. Hind wing: a point at base; an antemedial line, a double medial line conjoined on costa, a postmedial line expanding between veins 6 and 2, containing a buckthorn brown line, a subterminal line and an interrupted terminal line; cilia as on fore wing. Fore wing below with the markings all hair brown.

Expanse, 16 mm.

Habitat.—Col. Perene, Peru.
Type.—In Cornell University.
Paratype.—Cat. No. 27128 U. S. N. M.
Collected by the Cornell University Expedition. Differs from any known species by the longitudinal streaks at base of fore wing.

Parthenodes briocusalis, new species.

Female.—Body above and wings sepia, underneath and legs drab, the venter mostly white with sepia bands and spots. Fore wing: lines whitish rather indistinct; an outcurved subbasal and antemedial line; an outbent medial line across costa and cell and a parallel line beyond cell; postmedial line sinuous, retracted to postcellular line and inbent to medial line at cell, then outcurved to inner margin; small marginal white spots, indistinct except one above and one below vein 6. Hind wing: an antemedial whitish line from within cell, downbent to below middle of inner margin, and a similar wavy line from discocellular to inner margin near angle; a subterminal wavy line near anal angle and traces of whitish marginal spots.

Expanse, 15 mm.

Habitat.—Geldersland, Surinam.
Type.—Cat. No. 27021 U. S. N. M.
Near *P. scaralis* Schaus.

Parthenodes dabiusalis, new species.

Female.—Palpi, head and thorax white; abdomen white, the two basal and last segment with transverse cinnamon buff bands, the other segments with fuscous black bands. Fore wing: base white to a fine outcurved medial black line, almost entirely suffused with cinnamon buff, leaving a little white on costa and along the line, expanding towards inner margin; the line followed on costa by a triangular white spot, and below vein 2 by a broad fuscous black spot, otherwise by sayal brown to the very faint postmedial line which consists of blackish irrorations, outcurved at vein 5 incurved below vein 2, followed by blackish irrorations between veins 6 and 3, by white below vein 2 and a large clay color patch to near termen; a terminal clay color band edged with black, preceded by a white crescent from vein 7 to vein 4, by black below it to tornus interrupted by a small white spot between veins 3 and 2; cilia white except between veins 3 and 4 where it is black, also with black at base and at apex. Hind wing white; a short antemedial bister line on inner margin; some very fine and faint tilleul buff medial shading ending on inner margin in a broad black fascia; a subterminal avellaneous line and similar narrow shading on termen; subterminal and terminal shading yellowish towards anal angle; cilia white with some interrupted black marks near base.

Expanse, 18 mm.

Habitat.—Popocatepetl Park, Mexico.
Type.—Cat. No. 27022 U. S. N. M.
Near *P. mediocinctalis* Hampson.

Parthenodes gualbertalis, new species.

Female.—Body drab irrorated thickly with black; whitish segmental lines on abdomen dorsally; body below whitish, the abdomen with ventral black points; fore legs black, the tarsi white. Wings pale drab gray thickly irrorated with hair brown. Fore wing: a subbasal black line from cell to inner margin; before middle a broader black line from cell, slightly inbent to inner margin; a quadrate black spot in end of cell suffusing with a fuscous costal spot; discocellular line defined by some black scaling; an outer distinct whitish line followed by irregular black suffusions almost forming a subterminal line; termen very narrowly whitish with black points; cilia black tipped with white. Hind wing: a fine blackish line from cell before vein 2 to inner margin at postmedial line, this latter whitish with some black scaling proximally; a fine dark line terminally preceded by some very faint whitish scaling; cilia white with a black line at base.

Expanse, 13 mm.

Habitat.—Geldersland, Surinam.
Type.—Cat. No. 27023 U. S. N. M.

Bradina finbaralis, new species.

Female.—Palpi warm buff with two oblique sepia streaks. Body above fuscous black; a light buff line on patagia; abdomen with white bands on second and fourth segments, some yellow ocher on fifth, last and anal segments, also three silver segmental lines; body below white. Fore wing sepia suffused with purple, the markings maize yellow, somewhat darker on costa; a point at base and subbasal line; a broad antemedial fascia, vertical; a large medial spot from costa to below submedian fold; a fine lunule on discocellular and a small triangular spot on costa beyond; an apical spot and termen narrowly from apex to vein 3; a small black subterminal spot above vein 7, and a line below it suffusing with dark portion; base of cilia silver. Hind wing partly maize yellow; subbasal sepia fascia suffusing with the inner marginal sepia space which extends to near angle, is irregular inwardly, suffusing with a small spot below vein 2; outer half from costa to vein 2 sepia, its inner edge outcurved, suffusing with a subterminal sepia spot below vein 2 which is also connected with a marginal spot near angle, the termen below them maize yellow; a terminal maize yellow line from apex to vein 4; base of cilia silver.

Expanse, 15 mm.

Habitat.—Cordoba, Mexico.
Type.—Cat. No. 27024 U. S. N. M.

Bradina aaronalis, new species.

Male.—Palpi maize yellow with two oblique black streaks; frons maize yellow; vertex sepia with a medial yellow line; collar sepia medially, laterally maize yellow; thorax sepia, the patagia mottled with yellow; abdomen dorsally sepia at base followed by a maize yellow band and sepia mottling on third segment, the following segments light orange yellow with fine black and white segmental lines; anal tufts white and black; body below and legs white. Fore wing maize yellow; a basal and a subbasal black line; a thick fuscous black vertical antemedial line suffusing on inner margin with a large spot beyond it which is upbent to cell at vein 2 and then outcurved to inner margin; discocellular edged by a thick sepia line; a broad outer warm sepia fascia from costa to below vein 3, vertical to vein 5 and slightly outbent below it, between vein 4 and 3 touching the terminal light cadmium band, this latter with some small sepia spots on its inner edge below costa and above tornus; cilia maize yellow with a thick silver line at base and blackish tips. Hind wing maize yellow; a subbasal black fascia; a medial fuscous black patch from below vein 2 expanding on inner margin; a broad postmedial fuscous black fascia from costa to vein 3, suffusing between veins 4 and 5 with the black edging of the terminal light cadmium band, this black edging obsolete from before vein 2, a small subterminal dark spot below vein 2 and another at vein 1; cilia as on fore wing.

Expanse, 15 mm.

Habitat.—Cayuga, Guatemala.
Type.—Cat. No. 27025 U. S. N. M.
Allied to *B. finbaralis* Schaus.

Bradina hemmingalis, new species.

Female.—Body and wings above dusky hair brown; body below dull white. Fore wing: a wavy outbent antemedial black line; a black spot on discocellular; broad outer black shade from costa, diffuse on inner side narrowing to vein 2 where it is inbent a short distance then downbent to inner margin, and is followed from costa to vein 5 by a white line, broadish on costa; cilia hair brown with a darker line near base. Hind wing: a postmedial line retracted below vein 2 and downbent to inner margin; cilia white with a fuscous black line at base.

Expanse, 16 mm.

Habitat.—Jamaica, West Indies.
Type.—Cat. No. 27026 U. S. N. M.

Camptomastix baracoalis, new species.

Female.—Palpi vinaceous brown. Head and thorax russet vinaceous; abdomen above vinaceous drab, the anal segment russet vinaceous; body below and legs white. Fore wing drab irrorated and suffused with russet vinaceous, on termen with benzo brown; a triangular buff yellow spot on middle of costa, its apex at lower angle of cell, edged behind by a ferruginous line which extends to base of costa and distally as a streak below costal edge which is buff yellow; cilia white except from just above vein 2 to vein 4 where it is benzo brown and the margin is produced. Hind wing mostly drab, except costa which is broadly white to near apex.

Expanse, 13 mm.

Habitat.—Baracoa, Cuba.
Type.—Cat. No. 27027 U. S. N. M.

This species only differs from typical Camptomastyx in the produced apex and middle of termen of fore wing.

Deuterophysa obregonalis, new species.

Male.—Body above and wings saccardo's umber, the abdomen with white segmental lines above and below. Fore wing: a faint darker antemedial line slightly outcurved; a faint darker medial fascia; a large white postmedial spot on costa, narrower and rounded at vein 4 edged by a fuscous black line, a fuscous black terminal line; cilia white below apex and above tornus. Hind wing: a faint whitish postmedial line slightly outcurved beyond cell; a fuscous black terminal line; cilia partly white.

Expanse, 19 mm.

Habitat.—Slopes of Popocatepetl, Mexico, at an elevation of 10,000 feet.
Type.—Cat. No. 27028 U. S. N. M.

Stenia ambialis, new species.

Male.—Antennae serrate with white cilia. Palpi fuscous the fringe mottled with whitish; head buffy brown; thorax brown mottled with gray; abdomen above cinnamon, segments 2 to 5 with broad black bands and white segmental lines, underneath snuff brown. Fore wing white suffused with light buff and

irrorated with fuscous and black; base of costa black; a subbasal black point in cell; antemedial line fine black outangled on median followed in cell by a small black ocellus; costa from antemedial to apex clay color with black spots; two small white spots on discocellular edged with black; postmedial line black distally edged with white, wavy, slightly outbent from costa and vein 3, curved and retracted to lower end of cell, downbent and outcurved across fold, followed by a broad fuscous shade crossed by black lines on veins; subterminal white scaling from below costa to vein 5; a terminal black line, expanding into small spots. Hind wing whitish, the costa and inner margin smoky gray; medial black irrorations not reaching costa, its lower outer edge continued as a smoky shade to inner margin; a wavy postmedial fuscous line downbent at vein 2 to termen; termen broadly suffused with fuscous; a black marginal line coalescing with proximal black spots; cilia on both wings white crossed near base by a black line inwardly edged with buff, and with black spots on fore wing at apex and veins 4 and 3, on hind wing at vein 6 and vein 4.

Expanse, 12 mm.

Habitat.—Jalapa, Mexico; also from Guatemala.
Type.—Cat. No. 27109 U. S. N. M.

Stenia nennuisalis, new species.

Female.—Palpi head and thorax buffy brown, some white hairs on metathorax; abdomen above drab irrorated with fuscous, white segmental line at base and on terminal segments. Wings tilleul buff irrorated with buffy brown. Fore wing: antemedial line light buff outangled in cell, outwardly shaded with fuscous from subcostal to inner margin; a fuscous annulus on discocellular; postmedial line light buff broadly shaded on both sides with fuscous faintly wavy, inangled at discal fold retracted at vein 2 towards discocellular which it does not reach and downbent to inner margin; terminal triangular fuscous spots connected by a fine line; cilia buff white crossed by two dark lines. Hind wing more whitish and thinly irrorated to the postmedial line which is whitish defined by slightly darker shading; termen broadly more thickly irrorated with buffy brown; a diffuse terminal fuscous line; cilia as on fore wing. Hind wing below whiter except on costa; a double dark streak at discocellular; terminal line reduced to spots.

Expanse, 28 mm.

Habitat.—Trujillo, Peru.
Type.—Cat. No. 27110 U. S. N. M.
Allied to *S. gelliasalis* Walker.

Stenia dominicalis, new species.

Female.—Palpi, body above and wings buffy brown, the palpi below and throat white; abdomen below whitish buff irrorated with drab; fore coxae and tarsi olive brown, the latter with white rings; mid and hind legs light buff, the spurs fuscous black. Fore wing: antemedial line fuscous slightly outangled on median, followed in cell by a small fuscous annulus and a larger annulus over discocellular; postmedial line fuscous distally edged with white except where retracted along vein 2, dentate from costa, inangled at fold, retracted at vein 2

to near cell, curved and slightly outbent below vein 2 to inner margin; terminal black spots on interspaces; cilia buffy brown with a pale line at base. Hind wing: a postmedial pale line dark shaded on both sides, vertical from costa to vein 2 at termen, retracted and very faint to inner margin; small triangular black terminal spots. Hind wing below whiter, the postmedial line curved, inangled at fold; a dark spot on discocellular; termen broadly buffy brown. Male antennae with tuft before middle.

Expanse, 18 mm.

Habitat.—Dominica, B. W. I.
Type.—Cat. No. 27111 U. S. N. M.
Near *S. declivalis* Dyar.

Stenia ceddalis, new species.

Male.—Antennae serrate ciliate with a tuft at one-third from base. Body above hair brown, underneath whitish thickly irrorated with hair brown; mid and hind legs drab gray, the tarsi whitish, fore legs hair brown, the tarsi with pale rings. Fore wing thickly irrorated with hair brown; a fuscous black diffuse antemedial line slightly outbent; reniform faintly paler, very indistinct; postmedial line pale with fuscous black shading proximally, wavy, slightly incurved at discal fold, retracted at vein 2 to lower angle of cell and downbent to inner margin; a very fine interrupted terminal fuscous line; cilia hair brown crossed by two black lines, with a whitish line at base interrupted by black cilia at veins. Hind wing whitish irrorated with hair brown more thickly on termen especially at apex; a very fine terminal line; cilia white crossed by a single black line and without black spots at veins. Hind wing below whiter with irrorations on costa and apex; traces of a fine dark postmedial line.

Expanse, 13 mm.

Habitat.—Cayamas, Cuba.
Type.—Cat. No. 21112 U. S. N. M.
Allied to *S. dominicalis* Schaus.

Stenia midalis, new species.

Female.—Body and wings cupreous buffy brown, palpi white below, legs avellaneous. Fore wing: lines fine, fuscous; a vertical subbasal line; antemedial line wavy, outangled on median; a streak on discocellular; postmedial wavily dentate slightly outcurved to above vein 2, retracted to near discocellular and downbent, terminal fuscous spots; cilia hair brown darker shaded at base beyond a pale line. Hind wing: a streak on discocellular; postmedial line incurved below vein 2 and downbent to inner margin close to anal angle; a terminal fuscous line; cilia mostly white with a fuscous line near base. Wings below paler, the lines as above.

Expanse, 21 mm.

Habitat.—Quevedo, Ecuador.
Type.—Cat. No. 27113 U. S. N. M.

Stenia marialis, new species.

Female.—Palpi fuscous, white below; head and thorax drab; abdomen above white at base, with narrow dorsal hair brown shade, the following segments hair

brown with fine segmental white lines; abdomen laterally and below silvery white; legs mostly buff white, the fore legs streaked with drab. Fore wing drab with darker markings; an outbent antemedial line; a lunule on discocellular; postmedial line vertical to vein 2, retracted towards cell to above vein 2, and downbent, followed by a very faint light drab narrow shade; terminal dark points; cilia light buff at base followed by a drab line, the tips broadly white. Hind wing white, thinly scaled, the termen suffused with drab; a hair brown postmedial wavy line slightly retracted at vein 2. Fore wing below paler without the antemedial line.

Expanse, 20 mm.

Habitat.—Volcan de Santa Maria, Guatemala.
Type.—Cat. No. 27114 U. S. N. M.

Stenia styxalis, new species.

Male.—Antennae ciliated. Body and wings above hair brown, the latter without markings; cilia fuscous black with a very faint paler line at base. Palpi below white; abdomen below whitish buff; legs whitish buff, the fore legs except tarsi hair brown. Wings below whitish, the fore wing and termen of hind wing suffused with hair brown; dark lines on discocellulars; a faint dark postmedial line, retracted on both wings below vein 2 to near cell.

Expanse, 20 mm.

Habitat.—St. Jean, French Guiana.
Type.—Cat. No. 27115 U. S. N. M.

Stenia cronanalis, new species.

Male.—Palpi fuscous above, white below. Body white; a fuscous line on collar outwardly; a segmental black line between first and second segments of abdomen, the following three segments with dorsal fuscous spots, the terminal segments fuscous black dorsally with white segmental lines; fore tibiae and tarsi fuscous black. Wings white with terminal fuscous black points, the lines fine, buffy brown. Fore wing: costal margin suffused with buffy brown; an outcurved antemedial line followed by a broken ocellus in cell at subcostal; discocellular defined by lines; postmedial finely wavy, vertical to vein 2, retracted, almost obsolete to below cell and wavy to inner margin. Hind wing: a line on discocellular; postmedial line lunular between veins 5 and 2, retracted but faint to below cell and curved to inner margin.

Expanse, 22 mm.

Habitat.—El Campamiente, Col. Perene, Peru.
Type.—In Cornell University.
Paratype.—Cat. No. 27116 U. S. N. M.
Near *Stenia costalis* Hampson. Collected by the Cornell University Expedition.

Stenia bademusalis, new species.

Male.—Palpi fuscous above, white below. Body white; a fuscous line on collar laterally and shoulders below; abdomen with small dorsal buffy brown spots except on three basal segments. Fore wing white; costa suffused with

buffy brown; a faint buffy brown spot in cell and discocellular lines; postmedial line faint, buffy brown, slightly outbent from costa to termen at vein 2, retracted to vein 3 and cell but almost imperceptible, then vertical to inner margin; terminal sayal brown points; cilia white. Hind wing white; a faint postmedial line outcurved between vein 5 and termen near tornus; an interrupted terminal sayal brown line, faintly lunular.

Expanse, 23 mm.

Habitat.—Hacienda San Juan, Col. Perene, Peru.
Type.—In Cornell University.
Paratype.—Cat. No. 27117 U. S. N. M.
Near *S. costalis* Hampson. Collected by the Cornell University Expedition.

Stenia carthaghalis, new species.

Male.—Palpi fuscous above, white below. Head, thorax and base of abdomen white, the latter otherwise light buff dorsally with white segmental lines. Wings whitish buff the lines fine hair brown; terminal blackish points; cilia tipped with white. Fore wing: costal margin and postmedial space from cell to line finely irrorated with hair brown; antemedial line outcurved followed by a dark point in cell at subcostal; a black line on discocellular; postmedial line from a black spot on costa, wavy, outcurved from vein 5 to vein 2, retracted to near lower angle of cell and erect to inner margin; the termen suffused with wood brown, broadly so at apex. Hind wing: a black spot on discocellular; postmedial line inangled at discal fold, outcurved to near termen at vein 2, retracted and downbent to inner margin near tornus.

Expanse, 16 mm.

Habitat.—El Campamiento, Col. Perene, Peru.
Type.—In Cornell University.
Paratype.—Cat. No. 27118 U. S. N. M.
Collected by the Cornell University Expedition.

Stenia primolalis, new species.

Female.—Head white, a buffy citrine line across top of frons, and a similar mark on vertex; body white, the tegulae fuscous in front; a honey yellow spot on shoulders; legs whitish with some buffy markings. Wings white, the markings honey yellow. Fore wing: the basal half of costa honey yellow; an antemedial inbent fascia, interrupted at median; a medial fascia inbent with a fine white line on discocellular; a postmedial fascia narrow on costa, expanding to inner margin at tornus; a large terminal spot from below costa to vein 2, leaving a narrow incurved white line between it and the postmedial. Hind wing: a medial fascia; postmedial terminating at anal angle; a terminal spot from apex to vein 3. Fore wing below pale isabella color, with some whitish markings on disc. Hind wing below white, the markings duller; the medial fascia with a whitish dark edged spot on discocellular.

Expanse, 14 mm.

Habitat.—Geldersland, Surinam.
Type.—Cat. No. 27119 U. S. N. M.

Stenia guianalis, new species.

Female.—Body white; some dorsal drab shading on three terminal segments of abdomen. Wings white, the lines isabella color. Fore wing: costa suffused on basal half with light drab; antemedial line slightly outbent, beyond it a small drab spot below subcostal; discocellular defined by dark lines from costa; postmedial line remote, vertical to vein 5, outcurved to below vein 3 and retracted to lower angle of cell, then vertical to inner margin; termen suffused with isabella color; cilia white. Hind wing: a faint line on discocellular; postmedial line outcurved from vein 5 to vein 2 and retracted to near cell; terminal suffusions, interrupted between veins 4 and 2.

Expanse, 15 mm.

Habitat.—St. Jean, French Guiana.
Type.—Cat. No. 27120 U. S. N. M.

Stenia turiafalis, new species.

Male.—Body white, some buffy brown on collar and shoulders; abdomen above buffy brown. Wings white, the markings buffy brown. Fore wing: the costal margin buffy brown, reaching vein 6 except at termen; traces of an antemedial line below cell and on inner margin; an annulus in cell from subcostal to near median; discocellular long, oblique, defined by buffy brown lines; postmedial line vertical to vein 2 close to termen, retracted to end of cell at vein 3, curved across vein 2 near cell and downbent, slightly sinuous to inner margin; broad streaks between vein 4 and discal fold on terminal space; veins 1 and 2 slightly suffused with buffy brown; a terminal line, punctiform from discal fold to apex; cilia white with brownish spots beyond base. Hind wing: a streak on discocellular; postmedial line slightly wavy, vertical from costa to termen at vein 2, retracted to cell, curved and sinuous to inner margin; a terminal line not reaching anal angle. Fore wing below with broad diffused streaks on veins 2–5.

Expanse, 20 mm.

Habitat.—Peru?
Type.—Cat. No. 27121 U. S. N. M.

Stenia caclamalis, new species.

Male.—Antennae ciliated; head and thorax drab, the latter with some white; abdomen white dorsally suffused with drab except at base. Fore wing with the apex produced and acute, thinly scaled, white, the costa and termen broadly suffused with aeneous drab. Hind wing semihyaline white; some drab shading and terminal points at apex. Hind wing below with a drab streak on upper discocellular; a fine postmedial line on costal margin.

Expanse, 22 mm.

Habitat.—Colombia.
Type.—Cat. No. 27122 U. S. N. M.

Stenia cayugalis, new species.

Female.—Palpi white with a fuscous streak above. Body and wings chamois, the markings fuscous, the lines consisting of fine diffused scales. Fore wing: basal half of costa with dark irrorations; antemedial line outcurved followed by a

small annulus in cell at subcostal; reniform defined by lines; postmedial line vertical from costa to discal fold where it is slightly inangled, then outcurved to vein 2, retracted and obsolescent to lower angle of cell and wavily downbent to inner margin; terminal small triangular spots becoming linear towards apex; cilia smoky gray crossed near base by a macular black line. Hind wing: a sinuous medial line; postmedial line wavy to termen at submedian fold; a terminal line; cilia as on fore wing. Underneath paler, the markings a trifle finer.

Expanse, 14 mm.

Habitat.—Cayuga, Guatemala.
Type.—Cat. No. 27123 U. S. N. M.
Near *S. mononalis* Dyar, but much smaller.

Stenia herreralis, new species.

Female.—Palpi fuscous, underneath white; head and thorax cinnamon drab; abdomen light buff, dorsally suffused with drab except on pale segmental lines Fore wing whitish, thickly irrorated with drab, the lines fine hair brown; antemedial line outangled below cell; a small medial spot in cell; a line on discocellular; postmedial line slightly incurved from costa to vein 5, outcurved to below vein 3, retracted towards cell, downbent and outangled on fold; terminal black points on interspaces; cilia light buff at base followed by a hair brown line, the tips broadly silvery light buff. Hind wing white thinly irrorated with drab on outer half from costa to vein 2; a medial outcurved hair brown line; a postmedial line, inangled above vein 5, then downbent to termen below vein 2; an interrupted terminal line; cilia as on fore wing. Wings below buff white, the lines as above but punctiform. The wings broad.

Expanse, 18 mm.

Habitat.—Volcan de Santa Maria, Guatemala.
Type.—Cat. No. 27124 U. S. N. M.

Stenia caulealis, new species.

Male.—Antennae pubescent. Body above silky hair brown, the base of abdomen white except a dorsal line; underside and legs silvery white, the fore legs partly hair brown. Fore wing aeneous hair brown, the cilia tipped with grayish. Hind wing semihyaline white, the termen suffused with aeneous hair brown. Fore wing below paler.

Expanse, 20 mm.

Habitat.—Volcan de Santa Maria, Guatemala.
Type.—Cat. No. 27125 U. S. N. M.

Stenia beuvealis, new species.

Female.—Palpi fuscous black. Head and body white; neck behind fuscous; abdomen above with faint pale grayish bands. Fore wing white suffused with cream buff; costa fuscous to beyond middle; antemedial line cinnamon drab, outcurved below cell, followed by a fuscous spot at subcostal; discocellular defined by two fuscous lines; postmedial line black on costa, below it cinnamon drab, slightly outbent at fold and vertical to vein 2, retracted, but very faint, along vein 2, not reaching cell and downbent to inner margin; terminal fuscous points;

cilia cream white; a black point at apex. Hind wing white suffused with cream buff beyond cell to apex; a fine postmedial wavy line from costa to vein 2 at termen; a fine and faint terminal line; cilia as on fore wing, without the apical black point. Wings below whiter, the markings very faint.

Expanse, 14 mm.

Habitat.—St. Laurent, French Guiana.
Type.—Cat. No. 27126 U. S. N. M.

Stenia branealis, new species.

Female.—Body and wings above cinnamon buff irrorated with drab and black. Palpi below and throat white; body below and legs buff white, the fore legs with some dark markings. Lines on wings fine, black. Fore wing: a subbasal black point on inner margin; antemedial line outcurved; a small ocellus at middle of cell on subcostal; two black lines at discocellular, the proximal line curved; postmedial line remote, wavy, inbent to vein 5 then outcurved and retracted to near cell, hardly traceable where retracted, downbent to inner margin; terminal black points; cilia cinnamon buff with faintly darker spots. Hind wing: a fine medial line; postmedial line outcurved and minutely dentate between veins 5 and 2, terminating at vein 2 near termen; a fine marginal crenulate line. Wings below paler with a few irrorations on fore wing; postmedial line as above; terminal black points on both wings; a black bar on discocellular of hind wing; antemedial line from vein 2 to inner margin.

Expanse, 17 mm.

Habitat.—Kingston, Jamaica.
Type.—Cat. No. 27127 U. S. N. M.

Piletocera agathanalis, new species.

Male.—Fore wing with the costa straight, the apex rounded and somewhat produced, the termen incurved from vein 5 to vein 3. Palpi and head drab, collar and thorax pallid purplish gray, the patagia silvery; abdomen above drab gray, the base and anal segment white; body below white, the fore coxae cream color, a metallic brown shade at base of tarsi. Fore wing whitish, the costa cell and postmedial space before line suffused with purplish brown, the termen with fuscous; a fuscous spot at base of costa and a spot near base of inner margin; antemedial line fuscous, outcurved, almost angled at median; a fuscous black line on discocellular forming part of a fainter medial line, inbent from fold to inner margin; postmedial line rather remote, fuscous, vertical to discal fold, minutely wavy, slightly retracted below vein 3 and downbent to inner margin; faint terminal dark points; cilia whitish. Hind wing semihyaline, whitish, the termen suffused with purplish brown; a black point on discocellular; a dentate postmedial fuscous line to vein 3, retracted and forming a wavy medial line to inner margin; a fuscous terminal line; cilia whitish.

Expanse, 18 mm.

Habitat.—Tabernilla, Panama.
Type.—Cat. No. 27108 U. S. N. M.
Collected by A. Busck.

DESCRIPTION OF A NEW TERMITE FROM PORTO RICO.

By Thos. E. Snyder, *U. S. Bureau of Entomology, Washington, D. C.*

The Island of Porto Rico has a termite fauna of considerable interest, twelve species being known; four species belong to the family Kalotermitidae, one to the family Rhinotermitidae and seven to the family Termitidae. Among the most destructive known species in Porto Rico are the Kalotermitid *Cryptotermes brevis* Walker, the Rhinotermitid *Leucotermes tenuis* Hagen and the Termitid *Nasutitermes morio* Latreille.

Recently Prof. G. N. Wolcott has found a new Termitid in the subgenus *Tenuirostritermes* Holmgren; this species is characterized as follows:

Nasutitermes (Tenuirostritermes) wolcotti, new species.

Soldier.—(Figs. 1 and 2). Head yellow-brown (light castaneous), beak darker, head constricted at about middle, with exception of depression at constriction, head and beak are in nearly a straight line in profile, head and beak with dense fairly long hairs and head with a few longer hairs, head widest posteriorly where broadly rounded. Small projections on front of head near beak. Beak slender and conical. Mandibler points vestigial (fairly short, slender and pointed).

Antenna yellow-brown, with 13 segments, pubescent; third segment subclavate, longer than second; fourth shorter than second segment; segments become longer to apex; last segment shorter, subelliptical.

Pronotum same color as head, darkest anteriorly where margin is slightly emarginate, saddle shaped, posterior margin slightly emarginate, margins with long hairs.

Legs yellow brown fairly elongate, slender, pubescent.

Abdomen yellow-brown, tergites with dense fairly long hairs and a row of longer hairs at the base of each tergite.

Measurements:

Length of entire soldier: 2.60 mm.
Length of head with beak: 1.05 mm.
Length of head without beak (to anterior): 0.70 mm.
Length of beak: 0.40 mm.
Length of pronotum: 0.12 mm.
Length of hind tibia: 0.70 mm.
Width of head (at widest point, posteriorly): 0.60 mm.
Width of head (at narrowest point, anteriorly): 0.42 mm.
Width of pronotum: 0.32 mm.

Worker: Head brown, hairy, antennae with 14 segments; post-clypeus twice as wide as long, projecting, bilobed.

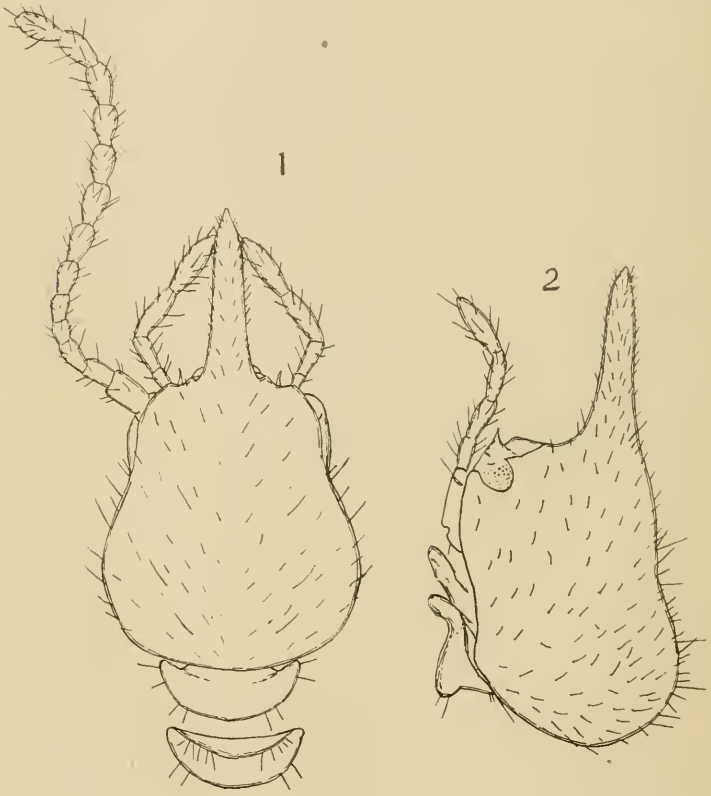
N. (*Tenuirostritermes*) *wolcotti* Snyder is a small, dark species, with a hairy, fairly prominently constricted head. It is smaller and darker and with a less constricted head than *T. tenuirostris* Desneux and differs from the Antillean species described by

Banks in 1919. The soldier of *T. strenuus* Hagen from Vera Cruz, Mexico, is unknown.

Type locality.—Boqueron, Porto Rico.

Described from seven soldiers collected with workers at the type locality by G. N. Wolcott on Nov. 7, 1923. These termites were in tunnels often nearly an inch wide (much wider than those constructed by *Nasutitermes morio* Latreille) and were on *Bucida buceras*. These shelter tunnels led to no nest but merely covered rotten wood. Species of *Tenuirostritermes* do not construct carton nests as do *Nasutitermes*.

Type, soldier.—Cat. No. 26757, U. S. N. M.



Soldier of *Nasutitermes* (*Tenuirostritermes*) *wolcotti* Snyder—1. Dorsal view of head and pronotum, also showing pronotum free from head; 2.—Lateral view of head and pronotum. (Drawings by Miss E. T. Armstrong.)

CRAMPTON ON THE LABIUM OF CERTAIN HOLOMETABOLA.[1]

By Alex. D. MacGillivray.

In a paper published in volume twenty-five of these Proceedings Dr. G. C. Crampton discusses with some detail the origin and structure of the labium of insects with a complete metamorphosis. He attempts by a series of figures of labia of species belonging to the Entopteraria to show how the various types were derived, or at least how he believes they were derived. The discussion is presented in such a convincing way, that as he says, "further discussion of this question would be merely a waste of time and space which might more profitably be devoted to other subjects."

With your permission I would like, nevertheless, to waste some of your space and time and to call attention to the fact that there is another way by which the facts presented can be explained. This different interpretation can be best followed and understood if the labia of some generalized insects are first described.

One of the most generalized types of labia known to me is that of the cockroach, as *Blatta*, figured by Yuasa and by Comstock. In this labium (Fig. 1) the proximal piece, the submentum, is the largest sclerite, deeply emarginate at the proximal and distal ends. In the emargination of the distal end there is located a small transverse sclerite, the mentum. To the distal end of the mentum is attached a large piece, which appears to be divided into two equal parts by a longitudinal furrow on the meson. This piece is formed by the fusion upon the meson of two sclerites and each portion is known as a stipula and the two together whether the furrow is distinct or not, as the stipulae (Yuasa, 1920). Each Stipula bears at its distal end two finger-like projections. Each lateral or outer projection is a paraglossa and each inner or mesal projection is a glossa. The outer or lateral margin of each stipula bears a shoulder-shaped sclerite, a palpiger, which in turn bears a three-segmented labial palpus.

The labium of insects is formed by the fusion on the median line during embryological development of two maxillae-like structures and for this reason the labium of insects is frequently designated as the second maxilla. The parts of the labium and maxillae are, therefore, homodynamous, the submentum with the subcardines, the mentum with the alacardines, the stipulae with the stipites, the palpigers with the palpifers, the labial palpi with the maxillary palpi, the paraglossae with the galeae, and the glossae with the laciniae.

Yuasa, who figures labia from representatives of each of the families of Orthoptera, brings out clearly that the mentum like the alacardo is an evanescent structure and present in only a few

[1]Contribution from the Entomological Laboratories of the University of Illinois, No. 83.

insects. The mentum even when present is a small transverse area and in many, if not most Orthoptera, is represented by a very short indefinite neck-like structure (Fig. 2) which is not separated from the stipulae by a suture. This sclerite, the mentum, is, therefore, a sclerite that is only rarely present as a separate sclerite in insects with an incomplete metamorphosis and, if we may judge from the condition found in the Orthoptera, the mentum is always fused, where it can not be identified as a separate sclerite, with the stipulae.

Let us now select for comparison with *Blatta* a generalized type of labium characteristic of an insect with a complete metamorphosis. The best examples are found among the Tiger-beetles and the Ground-beetles, which all systematists are agreed in considering as the most generalized of the groups of beetles. A representative of any genus selected from either of these groups would answer our purpose, but one of the common Ground-beetles, *Harpalus*, has been selected. The labium of this insect is figured by Comstock and is shown in most text-books.

The labium of *Harpalus* (Fig. 3) consists of a large dumb-bell shaped submentum with a small retractile mentum located in the emargination on the distal side of the submentum. To the distal end of the mentum there is attached a large lobe, the stipulae, the attachment of which is beneath a distal fold of the mentum. The distal end of the stipulae is composed of three projections, each outer or lateral projection is by comparison with *Blatta* evidently a paraglossa, but there is no suture separating it from a stipula as in the cockroach. The median projection undoubtedly represents the fused glossae and there is likewise no suture separating this median structure from the stipulae as in *Blatta*. Where the two glossae have been fused into a single projection, as in *Harpalus* and most beetles and many other insects, it has been designated as an alaglossa. It would be equally correctly designated as the glossae. Projecting from beneath the distal margin of the mentum and extending along each side of the stipulae, there are the cylindrical palpigers, which rest free upon the stipulae but are fused to the stipulae beneath the mentum. Each palpiger bears a three-segmented labial palpus. The sclerites of the labium of *Harpalus* are easily identified from those of *Blatta*, but the labium of *Harpalus* shows clearly that it has undergone some specialization. A comparison of the labium of *Harpalus* with those of other insect with a complete metamorphosis and biting mouth-parts will show that these latter labia show still other striking lines of specialization.

The mentum is a small submembranous area, sometimes completely concealed even in *Harpalus* because not fully extruded beyond the distal margin of the submentum. In the great

majority of beetles, probably ninety per cent or more, the mentum can not be identified and, as in insects with an incomplete metamorphosis, it is fused with the stipulae. It is evident then that the mentum in the Entopteraria like the mentum and alacardo of the Exopteraria is a sclerite found only in generalized insects.

Dr. Crampton bases his main findings upon the labia of six insects, if we may assume this from the order in which he takes up his discussion. These are: *Bombus*, one of the more specialized genera of Hymenoptera; *Rhipiphorus*, a beetle with a very unusually shaped head and greatly specialized mouth-parts; *Nemoptera*, one of the most peculiar genera of Neuroptera and highly specialized in all its structures; *Bittacus*, one of the most specialized in its mouth-parts of all the Mecoptera (even the most generalized mecopteran in this respect is highly specialized); *Empis*, one of the Dance-flies, which has a long slender, greatly modified labium; and *Pulex*, a flea, which has specialized mouth-parts, but since it has no bearing upon the later discussion is not considered. The five labia to be considered represent in each case the tips of more or less extreme lines of specialization.

For one unfamiliar with the structure of the labia of insects, particularly when studying the figures and descriptions of Dr. Crampton, his series seems invulnerable and incontestable. One does not observe the fact that they represent the tips of lines of evolution that show a convergence in form. The difficulties do not appear until the homology of the individual labia is examined.

If the mentum has been suppressed in the mouth of specialized biting insects, it is not likely to be present in sucking insects. The labium in the Hymenoptera always lacks as a separate area the small sclerite generally designated as the mentum. The submentum is generally small and frequently wanting. More concisely stated, the submentum is entirely membranous. The large area designated as the mentum in Dr. Crampton's Figure 7 is the combined stipulae and mentum. This area is quite generally, however, designated in all bees as the mentum and, I believe, incorrectly. There is no disagreement with the homology of the other parts of the labium of *Bombus*, except that the labial palpus consists of only three segments instead of four as the figure suggests.

The generalized labium of a beetle has already been described. The labia of this order are too well known to offer any difficulty. That the proximal piece of Figure 8 should be considered as the submentum and lora is difficult to understand, since they are homologous with the same sclerite (Fig. 3) always found in this situation and which has been repeatedly proven to be a part of the gula. This means then that the portion labelled as mentum is a greatly elongated submentum and that the mentum is indis-

tinguishable. The palpigers are correctly identified, but they are not fused upon the meson but rest upon the stipulae just as they do in *Harpalus*. The stipulae, which are the same as the portion labelled as prementum in this figure, can be identified between the palpigers, while the long slender structure with an emarginate end probably represents the combined paraglossae and glossae. The mentum of *Bombus* as labelled in Figure 7 is homologous, therefore, with the so-called prementum of *Rhipiphorus*.

The labium of Nemoptera, judging from Figure 9, is similar to *Rhipiphorus*. The long proximal area is the submentum. The sclerite beneath the palpigers is the stipulae or prementum, and the region labelled as ligula represents the combined glossae and paraglossae.

The figure of the labium of *Bittacus*, Figure 10, is illustrative of Dr. Crampton's method. The labia of the Mecoptera, even of the most generalized species, is greatly modified and specialized from that of the cockroach or ground-beetle. That *Bittacus*, which has the labium very highly specialized, should have been selected as representative of the Mecoptera is in line with the selection of the other specilaized labia. Much criticism is made of the work of Otanes. The labium of a species of *Panorpodes* (Fig. 10b), where the area which is homologous with the area in *Bittacus* homologized as the palpigers but which in reality is the prementum, shows the absurdity of the conclusions reached. In *Panorpodes* the so-called palpigers is a broad area without the slightest depression on the meson that might be homologized as the suture between the so-called palpigers. It was my privilege to study all the preparations used by Mr. Otanes in the preparation of his paper and to compare his drawings with his dissections. I am ready to vouch for the accuracy of the drawings, but especially to emphasize his conclusions regarding the absence of a longitudinal median suture dividing the area labelled as the palpigers by Dr. Crampton. That there is no such suture existing in any of the species studied by Mr. Otanes, I know from my own observations. I mistrust that Dr. Crampton and Mr. Otanes are not writing about the same cleft.

Dr. Crampton would like us to believe he has an incontrovertible series showing the origin of his palpigers in his figures 7 to 10. As I understand him, this series would go as follows: in *Bombus* the palpigers are elongate distinctly separated pieces; in *Rhipiphorus*, a beetle, "the palpigers become approximated mesally, and they comprise the greater portion of the region *pm*" (the prementum); in the neuropterid, *Nemoptera*, the palpigers have "become still more closely approximated mesally than they are in" *Rhipiphorus*, "thereby reducing the area between the palpigers;" while in the mecopteran *Bittacus*, "the

palpigers, *pgr*, unite basally, and the region *pm*, or prementum, is composed chiefly of the united palpigers."

Will the homology of the various parts sustain the series or is it simply an analogy in form? Let us examine it. The palpigers of *Bombus* and the honey-bee are identical in form and position and need no further discussion. In the beetle actual observation of specimens shows that in *Rhipiphorus* the palpigers are not adjacent on the meson and that there is an area beneath the palpigers, the so-called prementum or stipulae, just as can be identified in the labium of practically all beetles. The labium of *Nemoptera* I know only from Figure 9. Since the labium of *Rhipiphorus* (the homology of which as given by Dr. Crampton is not correct according to my view) is no longer a cog in this series, can one be blamed for doubting even the homology adopted for *Nemoptera?* In fact, I am unable to understand how any one could imagine that the palpigers could become fused to the surface of a sclerite, the prementum, and suppress it, so that the palpigers would become the connecting sclerite between the mentum and ligula, to use Dr. Crampton's nomenclature. This article does not actually say this is what has taken place, but his descriptions of labia certainly imply it. I believe that future studies of the labium of *Nemoptera* will show that the line marking the line of separation of the palpigers as shown in Figure 9 is either secondary or imaginary and that this entire structure, except the shoulders to which the labial palpi are attached, is the prementum of Crampton and the stipulae of Yuasa, Otanes, and MacGillivray.

The statement of Mr. Otanes as to the homology of the distal part of the labium in the Mecoptera, regardless of what Dr. Crampton writes, is very definite and as follows: "There is a subquadrate area distad or ventrad of the submentum which consists of the fused stipulae, palpigers, glossae, and paraglossae." The distal shoulder-like portions only as shown in Figures 10, 10a, 10b, and 10c, are the palpigers. The remainder represents the fusion of the parts named. It is possible for sutures to become obsolete, but this can not be said of sclerites. They always fuse. I believe, therefore, with Mr. Otanes, that what Dr. Crampton is designating as the prementum is not the same structure to which he has applied this term in the other labia he has figured and that Mr. Otanes was justified in introducing a new term, as he says, "This area is here designated as the mecaglossa, because it is typical of the Mecoptera." This sentence also explains why he used the term mecaglossa, meca from Mecoptera. Attention should also be called to the fact that the term prementum, Crampton, 1921, which is applied to an entirely different structure in all the figures from mecaglossa, is antedated by the term stipulae, Yuasa, 1920. I do not believe that priority should ever be followed in determining the

names of sclerites and sutures, because the interpretation of homologies is continually changing with more extended studies and the nomenclature should be made to conform with our increase in knowledge of structures. The dates of the names cited above are only given that justice may be done.

That figure 11, the labium of *Empis*, looks to be a direct derivative from Figure 10, the labium of *Bittacus*, is very apparent. Peterson (Figs. 11a and 11b) studies and figures the labium of this same species and provides us with three figures. While we find no statement that the figure of Peterson is incorrect, yet Figure 11 does not show the central projection, *ag*, which is characteristic not only of *Empis* but of practically all the labia of Diptera that have been figured and which is shown by Peterson for this species. This central projection which is distinct even in this highly specialized dipteron, would certainly correspond to the ligula of Figure 9. It is the glossa of all modern writers, except Drs. Crampton and Tillyard, who have studied the labium of Diptera. Kellogg (Fig. 6) shows this central projection in *Rhyphus* as long as the lateral lobes or as three subequal lobes, a paraglossa on each side and a median glossae. Peterson is not alone in considering the labella as the homologues of the paraglossae of other insects. He has simply followed Kellogg and a host of other workers. Kellogg states the condition for the Nematocera, as follows: "Palpi are always wanting; no unmistakable indications of them are to be found, although in two forms examined, what may be palpar rudiments are present. The terminal lobes in freest conditions consist of the two free paraglossae sometimes apparently 2-segmented, and a median, always delicate, membranous lobe representing the fused glossae." We are indebted to Dr. Crampton for calling attention to one of the most interesting labia of any dipteron known or thus far figured, *Asyndulum montanum*, because it is so generalized. This is as might be expected one of the Nematocera, a Mycetophilidae. This labium is unknown to me other than through the figure of Dr. Crampton which offers the strongest *possible evidence* against his own contention that the paraglossae are the homologues of the labial palpi. The median projections of *Asindulum* undoubtedly represent the separated glossae, a condition unknown to Kellogg, and eliminates the necessity for a special name, palpal lobes or palpilobi, for these structures.

Attention has been repeatedly called to the fact that the labia dealt with by Dr. Crampton are highly specialized products and belong to insects that are recognized by all as representatives of highly specialized groups. I have tried to show that when the generalized members of the orders Hymenoptera, Coleoptera (Fig. 3), Neuroptera, and Mecoptera (Fig. 10b) are studied, the homology of the parts of the labia of specialized insects of these

orders are easily determined. The same is equally true of the generalized Diptera. When one studies the labium of any of the Nematocera, they are so typical that no one would consider homologizing the lateral lobes as labial palpi, even though they consist of two segments or as other than what they actually are, the paraglossae. The fact that two drawings similar to those of *Bittacus* and *Empis*, look alike and are similar in appearance is no proof that they are identical in homology.

Phylogeny is based upon homology, and a correct homology can *never* be constructed by using the terminal highly specialized tips of lines of development. A correct homology can be determined only through a study of the generalized members of each order and the determination of the sequence of the modification of these structures by following through from the primitive generalized ancestor to the highly specialized condition; never by proceeding in the opposite direction. It is a well proven fact that with the simplification of structures, specialization by reduction, there is often a convergence in form between widely separated groups and as a rule this convergence in form has no bearing upon the homology of the parts concerned. Homology can never be determined through an analogy in form as Dr. Crampton has tried to do with the labium.

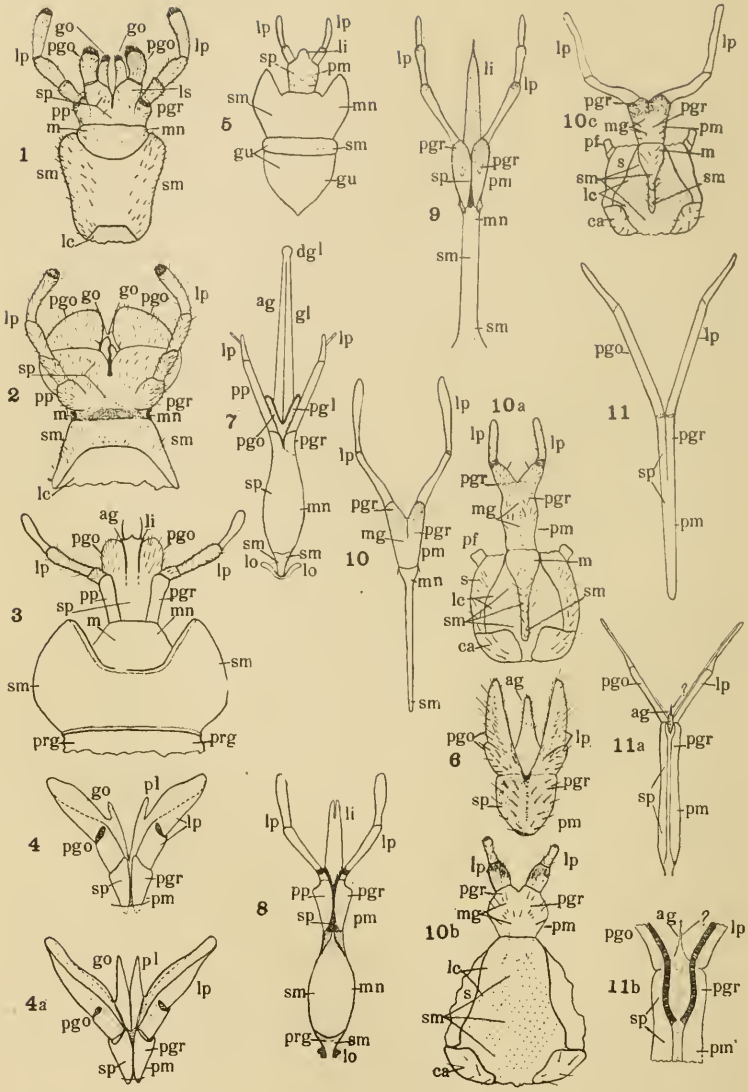
List of Abbreviations.

ag	alaglossa	*mn*	mentum
ca	cardo	*pf*	palpifers
dgl	distiglossa	*pgo*	paraglossa
gl	glossa	*pgr*	palpigers
go	glossa	*pl*	palpal lobes
lc	labacoria	*pm*	prementum
li	ligula	*pp.*	palpigers
lo	lora	*prg*	pregula
lp	labial palpi	*s*	stipes
ls	labiostipes	*sm*	submentum
m	mentum	*sp*	stipulae
mg	mecaglossa		

Explanation of Plate 4.

Each figure bears two sets of labels, those of Dr. Crampton are placed on the right side while those on the left side represent my interpretation of the same parts.

Fig. 1. *Blatta orientalis* (after Yuasa).
Fig. 2. *Melanoplus differentialis* (after Yuasa).
Fig. 3. *Harpalus caliginosus*.
Fig. 4. *Asyndulum montanum* (after Crampton).
Fig. 4a. *Asyndulum montanum* (after Crampton).
Fig. 5. *Hydrophilus* sp. (after Crampton).



MAC GILLIVRAY—LABIA OF HOLOMETABOLA

Fig. 6. *Rhyphus* sp. (after Kellogg).
Fig. 7. *Bombus* sp. (after Crampton).
Fig. 8. *Rhipiphorus dimidiatus* (after Crampton).
Fig. 9. *Nemoptera sinuata* (after Crampton).
Fig. 10. *Bittacus* sp. (after Crampton).
Fig. 10a. *Apterobittacus apterus* (after Otanes).
Fig. 10b. *Panorpodes oregonensis* (after Otanes).
Fig. 10c. *Bittacus strigosus* (after Otanes).
Fig. 11. *Empis clausa* (after Crampton).
Fig. 11a. *Empis clausa* (after Peterson).
Fig. 11b. *Empis clausa* (after Peterson).

THE IDENTITY OF SITOPHILUS (CALANDRA) RUGICOLLIS CASEY (COLEOP.).

By R. T. Cotton, *Entomologist, Stored Product Insect Investigations, Bureau of Entomology.*

Thirty-two years ago Colonel Casey described the species *Calandra rugicollis* from a single specimen said to have been collected by F. Kinsel in southern Florida, and presented to Casey by W. Jülich. Since that time no further specimens of this species have been found in this country and its identity has remained unknown.

On comparing specimens of Marshall's *Calandra shoreae* with the type specimen of *C. rugicollis* Casey the writer finds that they are the same species. Marshall described *C. shoreae* in 1920 from India where he states it is common, breeding in the seeds of the sal tree (*Shorea robusta*) and in the seeds of *Dipterocarpus turbinatus*. This same species was also described in 1921 from Mauritius by Hustache who gave it the name of *C. rugosicollis*.

It does not seem probable that this species will turn up again in Florida unless it is accidentally introduced from India where it is undoubtedly indigenous. Unless it was incorrectly labelled, Casey's specimen was probably carried to Florida in seeds from India. The synonymy is as follows:

Sitophilus rugicollis Casey.

Calandra rugicollis Casey Ann. N. Y. Acad. Sci. Aug., 1892, p. 287.
Calandra shoreae Marshall Bull. Ent. Research, Vol. xi, Pt. iii, 1920, pp. 276–277.
Calandra rugosicollis Hustache Ann. Soc. Ent. France. lxxxix, 1920 (1921) pp. 192–193.

NOTES ON THE MAXILLARY TEETH OF ANOPHELES.

By Raymond C. Shannon, *U. S. Bureau of Entomology.*

An examination of the maxillary teeth of *Anopheles maculipennis* Meigen was made, at the request of Dr. L. O. Howard, for the purpose of ascertaining whether teeth of this species varied in number in different regions of North America and how such differences correspond to the findings of Roubaud.[1] Roubaud has stated that in Europe *A. maculipennis* in malarial regions has an average of thirteen teeth and in regions where these mosquitoes feed exclusively on cattle the maxillae have an average of fifteen teeth, indicating also that in other non-malarial regions as many as eighteen teeth are found.

Material of *A. maculipennis* from California was supplied by Mr. S. B. Freeborn, Prof. Wm. B. Herms and Mr. P. G. Russell; from British Columbia by Mr. Eric Hearle and Mr. C. B. D. Garrett; and from Michigan by Dr. R. Matheson.

The variation in a series of nineteen specimens from Chico and Durham, near Chico, California, a notorious malarial region, covered the entire range of the number of teeth so far known for this species, thirteen to nineteen inclusive. Those from British Columbia numbered fifteen to twenty-one. It was found that the number of teeth varied in the same individual; in some instances, one maxilla would have a tooth or two more than the other. The increase or decrease may take place at either end of the row although it usually seems to take place within the row; the fewer the teeth the more widely separated they appear to be. In some cases one or more teeth would be very rudimentary. A magnification of 440 diameters had to be used in order to distinctly see the smaller teeth towards the tip.

The counts of the Durham specimens are: (1) 13–14; (1) 14–14; (4) 15–15; (2) 15–16; (2) 15–17; (1) 17–17; (1) 17–18. Average 15.4 teeth. The chico specimens gave counts of (1) 13–13; (2) 13–14; (1) 15 (one mx lacking); (1) 16–16; (1) 16–18; (1) 17–19. Average 15.15 teeth. Other California specimens as follows: Camarillo: (1) 15–17; (1) 16–17; Venturo: (1) 14–14; (1) 15 (one mx lacking); Santa Barbara: (1) 13–14; San Jacinto: (2) 13–13; (1) 14–15; (1) 16–16.

The Californian specimens range from 13–19; the average is 15.3. Considering the great and even variation shown in these specimens, mostly from the same region, it would appear that the practice of counting the teeth to ascertain whether the mosquitoes in this region prefer cattle to man and to determine their capacity for carrying malaria on this basis would be without much practical value. Moreover the average corresponds to that claimed by Roubaud to be characteristic for the race of *maculipennis* in France that feeds exclusively on cattle.

[1] Bull. Soc. Path. Exot., Paris, xiv, pp. 577–595, 1921.

It is worthy of note that the number of maxillary teeth of *Anopheles maculipennis* seems to run consistently higher in the more northern and nonmalarial regions of North America. Seven specimens from Hatzie, British Columbia, ranged continuously from 15–18 teeth per mx; twenty-two from Oliver, British Columbia, had from 15–21 (4 maxillae had 21 teeth); three from Bessie Creek, Douglas Lake, Michigan, had 15–19 and one specimen from the heart of the Adirondack region, Buttermilk Falls, Rackett River, New York, had 17–18.

These give an average of 17.3 teeth per maxilla. This in a general way corresponds to Roubaud's statement, i. e. races of *A. maculipennis* which confine their attacks perhaps exclusively to cattle and horses (and probably other thick skinned hosts) have a higher number of teeth (fifteen in his statement) than those which choose man as their host. Roubaud evidently assumes that man was the original host of *A. maculipennis* and that the dentition averaged about 13 teeth per maxilla; but that this species is gradually coming to choose cattle as its host and under the influence of natural selection these mosquitoes are acquiring an increased number of maxillary teeth.

It is just as fair, on the other hand, and easier to believe that animals other than man were their original hosts and that the primitive number of teeth averaged higher. And in regions where man is now more numerous than other animals the mosquitoes are passively adapting their number of teeth to their thin skinned hosts. Furthermore it is possible to believe that in many regions the reason *A. maculipennis* prefers cattle to man is because cattle and other mammals, in the wild state, were their main source of food probably ages before man became sufficiently numerous to rival cattle as a source of food, and consequently they instinctively prefer cattle when both cattle and man are available.

Some miscellaneous counts on other species are appended.

A. quadrimaculatus Say (Stuttgart, Arkansas, Sept. 31, 1914) ten specimens showed counts very comparable to those of *maculipennis*, extending from 13–14 to 18–19; averaging 15.6 teeth per maxilla.

Counts made on *Anopheles punctipennis* Say (Plummers Island, Maryland, Dec. 25, 1923) show a rather consistent grouping around 15 and 16. The counts are (1) 13–14; (1) 14–15; (1) 15–15; (5) 15–16; (1) 15–17; (1) 16–17. Average 15.3.

Anopheles eiseni Coquillet, Canal Zone, Panama, showed counts of 13 and 14 teeth.

Anopheles (*Coelodiazesis*) *barberi* Coq., Plummers Island, Maryland, one specimen, had 11 and 12 teeth.

Counts made on a number of species of Sabethids ranged from 6–10.

THE PRESENCE OF AN EVERSIBLE GLAND IN A MIDGE.

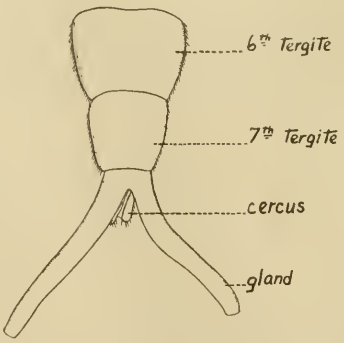
By W. A. Hoffman, *Department of Medical Zoology, School of Hygiene and Public Health, Johns Hopkins University.*

Recently Mr. H. S. Barber of the National Museum turned over to me for identification, a ceratopogonine midge he had captured in a trap lantern June 11, 1921, at Plummers Island, Md. He called my attention to a paired structure projecting from the posterior region. The specimen proved to be a female *Palpomyia subasper* Coq. From all indications the structure is of glandular nature. It is extruded between the seventh and eighth tergites, and at its base equal in width to the latter. Slightly beyond the site of emergence a sharp divarication in the form of two long narrow tubular branches takes place.

A few measurements were made to give a comparative idea of the extent of the glands: length of body from base of antennae to tip of abdomen, 4.5 mm.; of abdomen, 3 mm.; sixth and seventh tergites combined, .9 mm.; of gland, 1.25 mm.

An examination of the collection of the National Museum and my own material failed to indicate a similar condition for other individuals of the species, or for any members of the subfamily. Apparently eversion resulted from the use of chemicals such as benzol, alcohol and xylol, which substances Mr. Barber has found serviceable in preventing contraction of an insect when placed in them in the order mentioned.

No literature thus far encountered mentions the existence of these organs in nematocerous Diptera. Dr. Riley of the University of Minnesota suggested that the structure might be placed in the same category as that of the repugnatorial glands, found so frequently in a number of insects. What its function may be, is of course problematical.



Dorsal view of posterior part of abdomen; about 22x.

Actual date of publication, May 29, 1924.

EDITORIAL.

In an age as careless as ours in the use of terms, it is necessary to be particularly careful about definitions. If we would use an ambiguous word, we must clarify and restrict it by a very exact phrase. This à propos of "Economic Entomology."

Let it at once be clearly understood that we are not quarreling with the name. It has been universally accepted and it is here to stay. But just what do we mean by it? When we apply the qualifying adjective "economic" to entomology do we imply that entomology is economic, or that there are two kinds of entomology, one economic and the other uneconomic? Are we insisting upon the moral purpose—the social objective—of insect study; or are we discriminating between a moral and an unmoral entomology; investigation carried on with the avowed intent of serving man as against one that serves only the selfish purpose of personal gratification?

In every science there are certain individuals who explore the privacies and secrets of nature merely to gratify themselves. This is perfectly legitimate. One has a right to amuse himself as he will so long as he makes no trouble for others; but he can hardly expect society to support his hobby. Society will merely be grateful that his acquisitive instinct is for insects, and not for heads or pocketbooks. In entomology the hobbyist is a minor element. Considerable accidental benefit has derived from his activities; but he has never dominated in the science. Therefore, we may assume, that the adjective "economic" is applied to emphasize the essential function of entomology in the social economy and not merely to discriminate between two kinds of entomologists. Under this assumption every entomologist who is a true man of science—be he systematist, morphologist, biologist or special investigator—can legitimately claim to be an economic entomologist.

—*Carl Heinrich.*

NOTES AND NEWS ITEMS.

On wing nomenclature in Diptera.—In recent years there has been a notable revival of the so-called Schinerian system of names for wing veins in this order, and at the same time a considerable acceptance of the Comstock-Needham; as both of these are competing with the generally accepted ancient system sometimes erroneously attributed to Loew and Osten-Sacken, we have three different ways of designating the veins.

One curious result has been a tendency to use all three, or any two, in the same description. Hendel has often used indiscriminately the terms of the two older systems; as for instance in Archiv. f. Naturgeschichte, 1918, 113, he says (translation), "Mediastina ending independently as a fold before the first longitudinal." Malloch also has combined the Comstock-Needham with the ancient system very frequently, as for instance in Diptera of the Pribilof Islands, p. 184, "Distance between apices of third vein and first branch of media * * *"

Lack of time alone prevents me from citing other authors.

It is apparent that such mixing of nomenclatural systems must create great difficulties for the young student, as it is certainly confusing to the experienced.

—*J. M. Aldrich.*

The collection of immature stages of Diptera in the National Museum (Exclusive of Culicidae).—The Diptera in America are represented by 62 families. In the past very little work has been done with the immature stages. In our National Collection 53 of the families are represented by about 10,000 larvae and about 3,000 pupae. This material contains about 350 genera and fully 600 species. Both larva and pupa have fine family and specific characters.

I am greatly interested in the study of these immature stages and solicit any available material for study.

—*Chas. T. Greene.*

Some common flies little known in Maine.—Culex territans Wlk., seven males, at window, dead; one female, flying (previous record, Lincolnville, August, Dyar); *Anopheles punctipennis* Say, one female, flying (previous record, Weld, August, Dyar); *Muscina pascuorum* Mg. common in cupolas, all females (probably not collected before in Me.).. All at South Poland, Me., May, 1924.

—*R. C. Shannon.*

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PROCEEDINGS OF THE
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NEW SPECIES AND VARIETIES OF SPHENOPHORUS WITH NOTES ON CERTAIN OTHER FORMS.

By F. H. Chittenden, *U. S. Bureau of Entomology.*

The present paper includes descriptions of several distinctly new species and a larger number of variants, some of the latter so different from the typical species to which they are related that without a large series of specimens, it is difficult to indicate correctly their taxonomic status. The availability of considerable material has enabled a better understanding than could possibly have been obtained from a smaller series. While some of these variants are varieties only, there is indication that certain others may prove to be subspecies or geographical races. In most instances, in a good series for study, the variants here discussed are easily separable from specimens typical of the species.

Since the publication of the writer's five earlier papers on *Sphenophorus*, considerable knowledge has been obtained in regard to the distribution of the species of the genus and some of the outstanding forms are here mentioned mainly from the standpoint of geographical distribution.

Sphenophorus schwarzii, new species.

(Pl. 5, fig. 1.)

Form slender, nearly three times as long as wide, opaque black with porcelain-like gray natural covering on elytra and most of lower surface, including legs. Rostrum slender, seven-tenths the length of the prothorax; feebly arcuate in apical three-fourths, not constricted behind scrobes, extreme apex slightly produced posteriorly. Prothorax one-fourth longer than wide, moderately arcuate anteriorly, widest near middle; disc flat, opaque black; middle vitta a fine slightly elevated line extending from apex to base; lateral vittae polished black, narrow, of nearly uniform width, strongly elevated, extending from near apex nearly to base and enclosing with side margins, an elongate, flat, strongly declivous, oblong black area. Elytra one-fourth wider than prothorax, sides subparallel in basal half; scutellum subtriangular, sulcate at center; striae deep, closely, somewhat coarsely punctate. Intervals alternately finely, somewhat coarsely and closely punctulate. Pygidium gray-coated, sparsely variosely punctate, much finer about margins. Prosternum with large shallow black disc-like punctures, confluent and sinuous. Meso- and metasternum and nearly entire abdomen densely covered with long golden-yellow hairs. First and second ventral segments slightly concave with thin impressed median line,

surface confluently coarsely punctate; fifth segment less coarsely and less closely punctate, punctures bearing long hairs. Legs long, femora and tibiae densely fimbriate with similar long yellow hairs. Third joint of tarsi strongly explanate forming a rounded brush as wide as long, spongy pubescent beneath.

Length, 12 mm.; width, 4.2 mm.; length of rostrum, ♂ 3.6 mm.

Fortress Monroe, Va., May 29, 1891, collected by Dr. E. A. Schwarz in whose honor the species is named.

Type ♂.—Cat. No. 26,900 U. S. National Museum. One specimen.

Not closely related to any known form but is allied to the *aequalis* group, because of the nature of the external coating and tarsal structure, the brush of the extremely wide third tarsal joint being widely separated medially. It differs noticeably in the slender nearly straight rostrum, flat pronotum with declivous sides and strongly villous lower surface and strongly fimbriate legs. This beautiful species is so distinct from all others of the genus known to the writer as nearly to warrant the erection of a new genus for its reception.

AEQUALIS GROUP.

The following synopsis of the species and principal varieties is submitted:

Elytral striae moderately wide, with deep, rounded punctures.
  Thoracic vittae indicated
    Dorsal surface moderately punctate, nearly uniform, pale ocher, gray or pale bluish, E. U. S. to N. Dak. ..... *aequalis*
    Dorsal surface with black median line, Wash. ..... var. *univitta* n. var.
  Thoracic vittae distinctly elevated
    Dorsal surface more strongly punctate, pale brown, Tex ..... var. *scirpi* n. var.
Elytral striae narrower, with punctures less rounded
  Elytral strial punctures large and deep
    Dorsal surface entirely black, Cal. ..... *discolor*
Elytral strial punctures small and shallow; thoracic vittae black, elytra gray, Ut., Cal., Wash. ..... *ochreus*
Elytral striae very narrow, with punctures scarcely visible on disc.
  Dorsal surface black, with abraded or subobsolete interspaces and alternate intervals partially gray, Cal. ..... *pictus*

Sphenophorus aequalis univitta, new variety.

Dark, greasy-appearing gray, vertex, anterior face of femora largely, coxae, trochanters and middle of abdomen, shining black. Middle prothoracic vitta black in basal half, separated from lateral by large punctures. Scutellum black. Elytral striae coarsely and very closely punctate on disc. Anterior femora feebly, middle strongly villous.

Length: 12–16.5 mm.; width, 4.8–6.8 mm.; length of rostrum ♀ 3.5–4.5 mm.

Sprague, Wash., May 8, 1921 (M. L. Lane); Grand Coulee, Wash., July 8, 1902 (C. V. Piper).

Type ♀.—Cat. No. 26,899, U. S. National Museum.

Sphenophorus aequalis scirpi, new variety.

Dull yellow brown on dorsal surface, paler brown to dull ocherous on sides and ventral surface; entire surface more strongly and densely punctate than in typical *aequalis*, especially noticeable on prothoracic interspaces, where some punctures tend to coalesce. Prothoracic vittae narrow, distinctly elevated, darker brown. Elytral strial punctures, very closely set, intervals finely punctate rather than punctulate as in other forms of this group.

♂—Ventral concavity somewhat shallow, strongly villous; last ventral segment also strongly villous.

♀—Similar to *aequalis*.

Victoria Co., Traylors Lake, Tex. (J. D. Mitchell); McPherson, Kans. (J. K. McMillan).

Type ♀.—Cat. No. 26,908, U. S. National Museum.

Reared from corn and collected on *Scirpus* sp.

Sphenophorus aequalis Gyll.

Aberration *a*—differs from the above in having very wide prothoracic vittae, which vary from dark brown to subopaque black.

Cameron Parish, La., May 10, 1919. Collected on corn.

Sphenophorus ochreus Leconte.

Sphenophorus ochreus Leconte, Proc. Acad. Sci. Phila., 1858, p. 941; Chittenden, Proc. Ent. Soc., Wash., v. VII, p. 182, 1905.

In the writer's note on this species only Utah and Mexico were given as localities. It occurs at Salt Lake City and Provo, Utah; Volga, So. Dak.; Vallecito, Amedee, Cal., July 21, 4,200 ft. (Wickham); Paha, Wash., June 9 (M. L. Lane); Saskatoon, Saskatchewan (H. J. Atkinson).

Sphenophorus ochreus atrivittata, new variety.

Elytral intervals 1, 3, 5, 7 and lateral all subopaque black, 2, 4, 6, and sublateral white, each with a single row of shallow, round, black punctules. Striae with small fusiform punctures, somewhat remotely placed. Ventral surface not villous. Sexual characters about as in normal *ochreus*.

The coloration imparts a strikingly black and white striped appearance. It is the most attractive Sphenophorus known to the writer, but is merely a color variant, as proved by a transitional individual and the apparent lack of definite specific structural characters.

Length, 14 mm.; width, 5.7 mm.; length of rostrum, ♂, 3.5 mm.

Utah (Coll. C. H. Roberts).

Type ♂.—Cat. No. 26,901 U. S. National Museum.

Sphenophorus peninsularis nasutus, new variety.

Similar to typical *peninsularis*, differing chiefly as follows: Robust, nearly half as long as wide, with much less alutaceous natural coating. Rostrum ♀ only ¾ as long as prothorax, subequally dilated except at base, not suddenly recurved at apex. Prothorax nearly as wide as long; vittae wide, especially lateral, which have pronounced branch reaching base of prothorax; interspaces narrow, coarsely punctate. Elytra with distinct subapical callosity; intervals 1, 3, 5 and 8 elevated, 2 and 4 slightly so. Lower surface and sides below disc of thorax and elytra moderately shiny black, with little coating.

Length, 12.5–14.5 mm.; width, 5.8–6 mm.; length of rostrum ♀, 2.5–3.5 mm.

New York and vicinity (Wm. Juelich, Chas. Schaeffer); Mt. Pleasant, N. J. (E. G. Smyth).

Type ♀.—Cat. No. 26,907 U. S. National Museum.

The male is unknown. This variant evidently occupies a similar position in regard to the typical species as variety *intervallatus* to *setiger*.

Sphenophorus setiger intervallatus, new variety.

This name is proposed for an interesting series in which the first five elytral intervals are long, wide and subequally elevated, imparting to the variant an appearance very similar to that of *ludovicianus*. It is even darker than that species. The abdominal brush of setae and other normal characters are present in the male, and the absence of other apparent structural differences between this and typical *setiger* are indicative of varietal rank only.

Anglesea, N. J., July and August; Plymouth, Woods Hole, Mass.; Texas; New York and vicinity.

Type ♀.—Cat. No. 26,909 U. S. National Museum.

Sphenophorus laevigatus Chittenden.

Sphenophorus laevigatus Chittenden, Proc. Ent. Soc. Wash., v. VII, p. 58, 1905.

Comparison of a specimen from Winnipeg, Manitoba, collected by Professor Wickham, with the original description and type of this species from Utah shows no characters of separation. The same is true of two specimens labeled respectively "L. I." and "N. Y. City & vcty." The probabilities are that the last mentioned specimens are improperly labeled.

Sphenophorus robustus rectistriatus, new variety.

Prothoracic interspaces and elytra with fine profuse pumbeous alutaceous coating. Elytral striae fine, thin, but quite distinct, straight, with very small, regularly somewhat distantly placed rounded punctures. Intervals nearly flat, subequal in width, third feebly elevated at extreme base.

Length, 12.0–13.5 mm.; width, 4.8–5.5 mm.; length of rostrum ♀, 4–4.5mm.

New Buffalo, Mich., June, 1920 (M. H. Hatch); Indiana (J. B. Smith). Two females.

Type ♀.—Cat. No. 26,908 U. S. National Museum.

As there are all possible intergradations of this form and individuals with the extreme scarcely punctate elytra of *robustus*, it is evidently a variety only of that exceedingly variable species as regards elytral sculpture.

Sphenophorus blatchleyi, new species.

Body a little more than three-tenths as wide as long; opaque black, surface with very little dark alutaceous coating. Head obsoletely punctulate. Rostrum (♀) about two-thirds as long as prothorax, feebly nearly uniformly arcuate, very little compressed at base, not at all at apex; base feebly widened with subparallel sides, not protuberant; interocular puncture minute but distinct, surface of rostrum finely punctate and punctulate. Prothorax distinctly longer than wide, vittae similar to *zeae*, interspaces rugosely, less densely punctate. Elytra very little wider than prothorax; striae thin, irregular, with very large, irregular, mostly rugosely excavate, closely-placed punctures; intervals very narrow and very irregular bi- and uniseriately punctulate. Ventral surface coarsely variolately punctate, scarcely finer on apical end of middle of first abdominal segment. Tarsi subequal in width, third tarsal joint of the anterior legs little wider than the other two.

Length, 9.0 mm.; width, 3.3 mm.; length rostrum ♀, 2.2 mm.

Ormond, Fla., April 3, 1911 (W. S. Blatchley), one female. *Type* ♀.—Cat. No. 26894 U. S. National Museum.

Named in honor of Prof. W. S. Blatchley. Similar in general appearance to *zeae* Walsh, from which it differs markedly in the structure of the rostrum, in particular in the lack of the basal protuberance, the much coarser and shallower elytral punctures, the more densely punctate lower surface and the narrower third joint of the anterior tarsi.

Sphenophorus serratipes, new species.

(Pl. 6, fig. 4.)

Dorsal surface similar to *ulkei*, more slender, about three-eighths as wide as long, black, subopaque on dorsum, moderately shining on ventral surface; antennae mostly, tarsi entirely piceous. Rostrum two-thirds as long as prothorax, nearly straight, somewhat widely and uniformly compressed, moderately dilated at base, not strongly over scrobes; surface somewhat coarsely, densely punctate, at base more strongly and densely, not canaliculate and without impressed line, interocular depression feebly defined. Prothorax ♂ about three-fifths as wide as long, sides subparallel, apical constriction strong, surface nearly uniformly deeply densely punctate without apical fossa but with a narrow median smooth line, each side of which are two slight depressions in basal third. Scutellum sulcate at middle. Elytra one-fourth wider than prothorax; striae fine, much interrupted by large shallow foveae; intervals alternate in convexity, sutural and third subcarinate, biseriately, remainder uniseriately punctulate. First and second abdominal segments somewhat deeply, sparsely punctate; third and fourth short, finely remotely punctate; fifth deeply closely punctate at middle.

Tibiae strongly, more or less irregularly serrate on inner face, neither tibiae nor tarsi fimbriate. Third joint tarsi scarcely wider (⅓–¼) than first in all pairs.

♂—Pygidium subtruncate at apex. Ventral concavity moderately wide and somewhat shallow.

♀—Pygidium normal, feebly concave each side.

Length, 8.4 mm.; width, 3.0 mm.; length of rostrum, 2.2 mm.

Fort Collins, Colo., May 22, 1898 (Wickham); Medicine Hat, Alberta, Can. (F. S. Carr).

Type ♂.—Cat. No. 26,896 U. S. National Museum; paratypes also in the National collection at Ottawa, Canada; and in the collection of L. L. Buchanan.

The roughly serrate inner margin of the tibiae is evidently peculiar to this species, and this character, together with the long nearly straight equally compressed rostrum distinguish it from all others described from North America. It is closely related to *ulkei*, evidently replacing that species in the extreme North.

Sphenophorus cicatristriatus Fåhraeus.

Sphenophorus cicatristriatus Fåhraeus, *In* Schönh. Gen. Curc. v. IV, p. 958, 1837.
Spenophorus cicatripennis Fåhr. op. cit. v. VIII, 2, p. 262; Chevrolat, Ann. Soc. Ent. Fr. 1885, pp. 110, 111; Champion, Biol. Cent. Amer., Coleoptera, v. IV, pt. 7, p. 159, 1910.

Among a series of specimens submitted to Mr. G. C. Champion, both this species and *ulkei* were returned with the statement that they were identical. Three of these specimens indicate readily by the habitus that they are distinct from the latter. *S. cicatripennis*, according to Champion, was based upon examples with "a comparatively smooth prothorax, fewer foveae on the elytra, and the depressions of the surface 'pulverulent.'"

The prothorax, with the exception of the medio-scutellar portion which is deeply punctate and not divided as in *ulkei*, has the appearance of having been smoothed by artificial means, or by rubbing consequent to age, and the strial punctures are smaller, regularly and uniformly horse-shoe-shaped and more distantly placed on the disk in the basal portion. The prothorax is also longer with subparallel sides, and with distinct but small foveae in the medio-basal region, and there is one additional character which absolutely separates this species from *ulkei*. The head and rostrum are very feebly punctate, whereas in *ulkei* there are well defined, closely placed punctures. The third joint of the anterior tarsi is fully twice as wide as the second joint, whereas in *ulkei* the third joint is scarcely one-third wider than the second.

Specimens examined by Mr. Champion and the writer are from the State of Mexico, Mex. The writer also has examined

specimens from Atzcapotzaico, Mex., collected by Mr. E. G. Smyth, which are entirely lacking the pulverulence discussed by Fahreaeus, the entire surface being polished black.

Sphenophorus jugosus, new species.

(Pl. 6, fig. 1.)

Slender, black, opaque on dorsal surface, feebly shining on ventral, with portions of antennae, tarsi and apices of elytra piceous; no visible natural coating.

Rostrum ♀ four-fifths as long as prothorax, slender, moderately arcuate and compressed from apical fourth gradually stronger to apex; base and apex about equally compressed; base moderately protuberant, moderately dilated, sides subparallel, subvariolately punctate in basal half, more coarsely at base and on vertex of head. Prothorax (without apical constriction) not longer than wide, feebly bisinuate at base, somewhat indistinctly vittate, median vitta indicated by an irregular longitudinal area, broadest near middle, extending from apex, where elevated as on disc, a little beyond middle; lateral vittae represented by broad areas extending from base to beyond middle, these three areas scarcely elevated with few very small punctures; interspaces with few large coarse shallow variolate punctures, smaller at sides and still smaller apically. Scutellum short, triangular, deeply concave at base. Elytral surface uneven, with 7 strong transverse elevated ridges each side of third interval; striae fine, interrupted by moderate-sized deep irregularly rounded punctures; intervals feebly and remotely punctulate; 1 narrower than 2; 3 nearly as wide as 1 and 2 together, elevated and shining near middle; 5 slightly elevated. Apical tubercles prominent, humeri not prominent. Pygidium densely deeply punctate, convex, vestiture sparse, pale yellow with small apical tufts. Ventral surface sparsely coarsely punctate, punctures shallow, foveate on metasternum; first and second abdominal segment (♀) separated by well defined sutural line. Femora slender, with somewhat coarse shallow punctures. Tibiae slender, straight on outer face, obliquely truncate; anterior with outer face rounded and apical spur as long as width of tibiae, acute. Third joint of anterior tarsi little wider than second.

Length: 7.5 mm.; width, 2.8 mm.; length of rostrum ♀ 2.0 mm.

Type ♀.—Cat. No. 26,892 U. S. National Museum.

This species appears to be most nearly related to *destructor* and *callosus*, but has a longer and more slender rostrum, more slender femora and tibiae, has no natural coating and different punctation.

Sphenophorus incongruus elephantulus, new variety.

More robust throughout than typical *incongruus*, black, moderately shiny with pale gray alutaceous coating between and at sides of prothoracic vittae and on alternate intervals. Rostrum $\frac{5}{7}$ as long as prothorax, somewhat robust Prothorax only $\frac{1}{7}$ longer than wide, arcuate at sides; vittae wide; interspaces coarsely subvariolately punctate. Legs somewhat stouter than typical.

Length, 10 mm.; width, 3.5 mm.; length of rostrum ♀, 2.5 mm.

Western Kansas (E. A. Popenoe). A donation from Mr. C. H. Popenoe.

Type ♀.—Cat. No. 26,905 U. S. National Museum.

Sphenophorus robustior costifer, new variety. .

Body more slender than in typical *robustior*, more than two-fifths as long as wide. Prothorax shorter, as wide as long; vittae polished black, nearly covering the disc; interspaces very narrow, alutaceous. Elytra feebly alutaceous; intervals 1, 3, and 5 strongly elevated, shining. The existence of one individual intermediate between the variety type and typical *robustior* indicates that this form is not entitled to specific rank.

Length, 11.2 mm.; width, 4.3 mm.; length of rostrum ♀, 3.0 mm.

South Dakota (J. M. Aldrich); Lake Okoboji, Ia., June 21, 1917 (L. L. Buchanan).

Type ♀.—Cat. No. 26,895, U. S. National Museum.

Sphenophorus sublaevis Chittenden.

(Pl. 5, fig. 2.)

Sphenophorus sublaevis Chittenden, L. c., p. 176.

In Blatchley and Leng's Rhynchophora (p. 568) *sublaevis* is assigned as a variety of *callosus*. The differences are shown by the accompanying illustrations of both species and of *destructor*. Indeed, this form is intermediate between *callosus* and *destructor* and more nearly related to the latter. In the series which has been studied, the elytra are always strongly transversely and irregularly rugose. The ground color is black with a strong tendency to smoothness. One individual has certain portions of the dorsum shining black. *S. callosus* is always dull opaque.

This species is somewhat more northern in distribution than *destructor* but specimens of both have been seen from regions not far remote from each other.

Sphenophorus venatus Say.

Sphenophorus vestitus Chttn., Proc. Ent. Soc. Wash., v. VI, 1904, p. 134.

Additional experience in the study of the genus since the description of this species was made, together with the accession of a series of two specimens from Tappahannock, Va., July 20, 1916 (H. Fox) and one from Smith Island, Va., the last from the stomach of a toad, has convinced the writer that *vestitus* is simply a smooth gray-coated variation of *venatus*, not entitled even to a varietal name. Similar instances of smooth-coated specimens, in some cases, at least, newly developed, are not rare in the genus and are especially exemplified by *callosus* and *cariosus*.

Sphenophorus holosericus, new species.

(Pl. 6, fig. 2.)

Body ♀ robust, about two and one-eighth times as long as wide; opaque velvety black, inner surface of femora, knees, and tibiae shining black; no natural coating. Rostrum ♀ a little less than three-fourths as long as prothorax, strongly compressed, strongly protuberant over scrobes, moderately very irregularly arcuate; base deeply irregularly confluently punctate; interocular puncture small, deep, without impressed line, succeeding punctation arranged in somewhat irregular rows, gradually finer toward apex; feebly arcuate, nearly straight in middle half, strongly reflexed posteriorly at apical fifth, where it is widened about as over scrobes, outer face of apex strongly concave, inner face acutely produced at extreme apex. Prothorax about one-fourth wider than long, somewhat feebly convex on disk, surface deeply punctate at apex, densely at sides, more sparsely elsewhere, punctures confluent at sides of a thin smooth median area, and near base. Scutellum small, about twice as long as wide, nearly flat, declivous at extreme base. Elytra short, about four-fifths as wide as long, deeply narrowly striate, irregularly somewhat coarsely and sparsely punctate, punctures very distantly set; intervals subequal in width; third much wider, scarcely elevated, bi- and triseriately punctulate basally, others uniseriately. Ventral surface sparsely, somewhat finely and not deeply punctate. Legs finely and distinctly punctate. Anterior and posterior femora glabrous, middle pair slightly villous on inner surface. Tibiae slender, somewhat strongly angular on inner surface above middle, feebly serrate and villous; outer angle sinuous, at apex slightly produced, inner angle with a strong acute spur, and a shorter subapical spur, about one-fourth as long as apical one. All tarsi narrow, subequal in width.

♂—More slender than ♀. Ventral concavity shallow. Pygidium very small strongly rounded near apex.

♀—Rostrum slightly longer and more strongly compressed. Third elytral interval slightly widest, biseriately punctulate near base. Pygidium small, distinctly arcuate at apex, surface deeply sparsely punctate.

Length ♂, 7.0–8.5 mm.; width, 2.4–4.0 mm. Length ♀, 7.5 mm.; width, 3.0 mm. Length rostrum ♀, 2.6–2.8 mm.; of ♂, 1.8–2.2 mm.

Willis, Tex. (J. C. Bridwell); Columbus, Tex., June 25 (Hubbard and Schwarz); Victoria, Tex. (W. E. Hinds); Longview, Tex.; Arizona (H. K. Morrison).

Type ♀.—Cat. No. 26,893 U. S. National Museum.

This species bears no especial resemblance to any other in our fauna. The rostrum recalls that of *zeae*, is more coarsely punctate at base, while in the latter the median carina is lacking. The thoracic and elytral sculpture is peculiar, similar to *arizonensis*, in which, however, the punctures are smaller and rounded, and *deficiens* where they are partially oval and in part rounded, but more closely placed in rows. The type is larger, more robust and shows the specific characters much more clearly than the remainder, which are apparently dwarfed, especially the

males. In two males examined there is a finely impressed line below, but not continuous with, the interocular puncture.

Sphenophorus reticulatus, new species.

Form similar to *ulkei*, opaque dull black. Prothora more coarsely punctate, elytral sculpture finer, anterior tibiae obliquely truncate. Rostrum ♀ a little more compressed on apical third. Prothorax with a distinct median carina over half as long as prothorax, each side of which in basal half is a moderately deep, long fossa; surface more deeply, coarsely and densely reticulately punctate, without smoother spaces in usual location of lateral vittae, punctures confluent in submedian fossae and at sides posteriorly. Scutellum flat or slightly concave, feebly shining. Elytra finely striate, striae interrupted by much shallower contiguous and confluent foveae; intervals extremely narrow, scarcely wider than lines, subequal in width, 3, 5 and 7 more prominent, narrowly costate or subcostate, first or sutural and third biseriately, others uniseriately punctulate. Ventral surface more coarsely punctate than in *ulkei*, and more densely on last segment. All tibiae obliquely truncate, not visibly produced exteriorly.

♂—Metasternum deeply and narrowly concave through middle, concavity twice as long as wide and very coarsely punctate.

♀—Metasternum moderately and narrowly concave, less coarsely punctate Length, 9–10 mm.; width, 3.6–4.0 mm.; length ♂ and ♀ rostrum 2.0 mm.

Arizona, 1 ♂, 1 ♀.

Type ♀.—Cat. No. 26,897 U. S. National Museum.

In the male specimen the prominent intervals are much more narrowly costate, an individual, not a sexual, difference.

Sphenophorus bartramiae, new species.

(Pl. 6, Fig. 3.)

Black; surface except eyes, apical portion of rostrum and antennae, almost completely covered with a thick yellow-brown more or less natural felt-like coating to which argillaceous material adheres obscuring the punctation, striae and sculpture. Rostrum ♀ short, thick, one-fourth as long as prothorax moderately arcuate, narrower in middle third, dilated at apex. Prothorax subquadrate, wider than elytra except at base of latter, nearly as wide apically as at base, location of vittae and foveae faintly indicated, punctation fine and sparse. A minute median subapical callosity and a similar lateral sub-basal one, near basal angle of prothorax. Elytra strongly acuminate posteriorly forming an isosceles triangle; intervals subequal in width and height, finely uniseriately punctate. Lower surface finely and sparsely punctate. Legs and other characters not mentioned, similar to *minimus*.

♂—Pygidium wider and subtruncate at apex; first two ventral segments very feebly concave at middle.

♀—Pygidium narrow and rounded at apex with fine hairs; first two ventral segments subconnate.

Length, 6.5–8 mm.; width 2.8–3.2 mm. Length of rostrum ♀, 2 mm.; of ♂ 1.6 mm.

Victoria, Tex., March 28, 1907 (W. J. McAtee). Specimens taken from the crop of *Bartramia longicauda*, the upland plover.[1]

Type ♀.—Cat. No. 26,904 U. S. National Museum.

This species, while quite distinct, bears some resemblance to the related *minimus* but is much larger. The superficial characters alone separate it readily from any described form. In some individuals the elytra bear a subapical callosity on a distinct tubercle. In only one specimen examined is the character of the elytral punctation visible. Considerable individual variation is apparent even in a small series from a single locality. In most specimens the location of the striae is indicated by a few fine short jet black lines.

Sphenophorus necydaloides Fabricius.

Calandra necydaloides Fabricius, Systema Eleutheratorum, vol. VII, p. 435, No. 29, 1801; Olivier, Histoire Naturelle des Insectes, Paris, 1807, vol. V, No. 83, p. 94, Pl. 28, fig. 420.

Sphenophorus retusus Gyllenhal, Schoenherr, Gen. et Spec. Curculionidum v. IV, p. 949, 1837, Horn, Proc. Amer. Philos. Soc., 1873, pp. 427, 428.

The original description of Fabricius is briefly as follows:

"Statura omnino C. abbreviatae, at distincta et alia. Caput atrum, nitidum, rostro incurvo. Thorax niger, obscurus, vix punctatus. Elytra abdomine breviora, striato-punctata."

Olivier's description is in substance:

"Obscure black with a tendency to cinereous; thorax feebly punctate with the middle smooth. Elytra little shorter than the abdomen; striae feebly punctate."

The length of the species (*S. abbreviatus*) with which it is compared, and the hair-line of Olivier's figure is between 9 and 10 mm., the locality "Carolina." The original description is as recognizable as that of *melanocephalus*, and Olivier's interpretation of the latter with the accompanying figure is generally accepted. The illustration furnished by Olivier of *necydaloides*, together with his description, size, and locality, leave little doubt that that species is the same as *retusus* Gyll.

Sphenophorus chittendeni Blatchley.

Sphenophorus chittendeni Blatchley, Rhynch. N. E. Am., 1916, p. 565.

A specimen from Eaugallie, Fla., January 8, 1910, from the

[1]It is of interest that the upland plover feeds upon Sphenophorus to a considerable extent, the list of species including *germari*, *oblitus*, *compressirostris*, *costipennis*, *parvulus*, *venatus*, and several other weevils, some injurious.

stomach of *Sturnella granella*, also a specimen reported by Mr. L. L. Buchanan from Quitman, Ga., in stomach of a toad.

Sphenophorus oblitus Leconte.

Sphenophorus oblitus Lec., *in* Leconte & Horn, Rhynch. Am. No. of Mex., Proc. Am. Phil. Soc., v. XV, 1876, p. 425.

Widely distributed in Texas; also Shreveport, La., Montgomery, Ala. (H. Soltau); Duncan, Okla. (T. D. Urbahns); Rocky Ford, Colo. (H. O. Marsh); Rooks Co., Kansas; Arizona (H. K. Morrison).

Reported to be injurious to rice.

Sphenophorus tardus Fall.

Sphenophorus tardus Fall, Cal. Acad. Sci., v. VIII, 1901, p. 269, 270.

A single specimen from Willcox, Ariz., collected by Dr. A. K. Fisher. Previously known only from California.

Sphenophorus germari pinguis, new variety.

Similar to typical *germari*, shorter, more robust, twice as long as wide; elytra short, little longer and scarcely wider than prothorax. Dorsal surface opaque with many depressions and other inequalities, striae of elytra deeper, especially toward the apex where the punctures become more elongate and smaller. Anterior tibiae moderately angulate below the middle, nearer the apex than in *germari*.

Length, 8.0 mm.; width, 4.0 mm.; length of rostrum, 2.2 mm.

Tampa, Fla., April 15 (Hubbard and Schwarz).

Type ♂.—Cat. No. 26,906 U. S. National Museum.

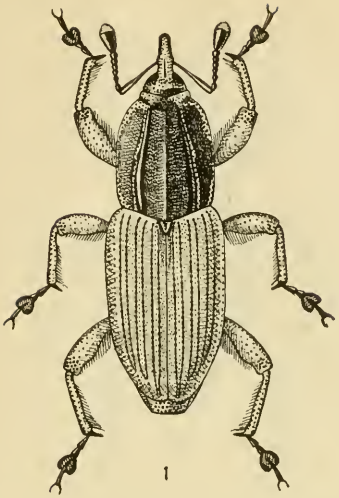
This may prove a distinct species, the last character alone being significant together with the habitus and the other characters mentioned. A larger series is desirable to establish or disprove this.

Sphenophorus compressirostris obscuripennis, new variety.

A digression from the common type is deserving mention, and there is indication that it merits recognition as a race. The principal distinguishing characters of normal *compressirostris*[1] are as follows:

Thorax opaque with vittae moderately distinct or indicated and moderately shining. Elytral intervals strongly alternately convex, alutaceous and usually more or less coated with argillaceous material, sculpture and punctation more or less obscure—Tex., Kans.

[1]Jour. Acad. Sci., 1823, p. 319; Lec. ed. v. I, p. 20; Horn, Proc. Am. Phil. Soc. 1873, p. 429.



Sphenophorus schwarzii

Sphenophorus sublaevis

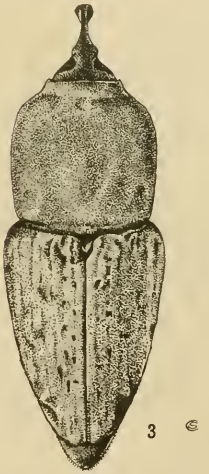
Sphenophorus callosus

Sphenophorus destructor

CHITTENDEN—NEW SPHENOPHORUS

Sphenophorus jugosus

Sphenophorus holosericus



Sphenophorus bartramiae

Sphenophorus serratipes

CHITTENDEN—NEW SPHENOPHORUS

Variety *obscuripennis* differs mainly as follows:

Thorax largely shining black on disc, sparsely punctulate except at sides and each side of median line near base. Elytral sculpture almost obscured by thick gray coating, intervals feebly indicated. Tooth of anterior tibiae very strongly developed.

Texas: Edinburg (Coll. Chttn.), Beeville and Sharpsburg (Hubb. & Sz.) Brownsville (Wickham), Koehler, N. Mex. (E. R. Kalmback).

Type ♀.—Cat. No. 26,903, U. S. National Museum; paratype Canadian National Collection.

The habitat of *obscuripennis* is extreme southern Texas and doubtless extends into Mexico.

Few specimens of typical *compressirostris* have been seen with no argillaceous coating, something that is to be noticed, however, in other species, e. g., *cariosus*.

Explanation of Plate 5.

Fig. 1, *Sphenophorus schwarzii*
Fig. 2, *Sphenophorus sublaevis*
Fig. 3, *Sphenophorus callosus*
Fig. 4, *Sphenophorus destructor*

Explanation of Plate 6.

Fig. 1, *Sphenophorus jugosus*
Fig. 2, *Sphenophorus holosericus*
Fig. 3, *Sphenophorus bartramiae*
Fig. 4, *Sphenophorus serratipes:* Rostrum and anterior tibia.

NEW BETHYLID AND SERPHOID PARASITES FROM NORTH AMERICA. (HYMENOPTERA.)

By Robert M. Fouts.

This paper contains descriptions of eleven new species and one new genus of Hymenoptera belonging to the families Bethylidae, Scelionidae, Calliceratidae and Diapriidae.

All measurements recorded 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 .0111 mm.

I take as the width of the thorax the length of a line drawn from the outside edge of one tegula to the outside edge of the other. In computing the height of the thorax an imaginary line is drawn from the middle of the mesonotum above to that part of the sternum just in front of the middle coxae below. When speaking of the length of the head I mean its greatest length, not back to the foramen magnum but to the apices of

the lateral lobes. The "proportion" discussed several places in this paper is obtained by dividing the width of the head by the length of the thorax and multiplying the result by the length of the second tergite.

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

Family BETHYLIDAE.

Psilodryinus carinatus, new species.

Female.—Length 4 mm. Runs to section 4 in Kieffer's key (Das Tierreich, Lief. 41, 1914, p. 54), and differs from *sumatranus* in having the abdomen dark. From *acuticollis* (ibid., p. 56), it differs more particularly in having the basal nervure about as long as the nervulus, and in having the first tarsal joint of the anterior leg a little over twice as long as the second and third united. The species may be distinguished from *thoracicus* (Fouts, Philippine Journ. of Science, vol. 20, 1922, p. 632), by having a small subbasal tooth on the outer claw and by having the fourth joint of the anterior tarsus only slightly longer than the second and third united.

Scape very little longer than the second joint, the latter twice as long as thick; prothorax a little longer than the combined lengths of the mesonotum and scutellum; scutellum separated from the mesonotum by a transverse depression, the latter partitioned eight times longitudinally; propodeum with many more or less straight and parallel longitudinal ridges, the intervals twice as wide as the ridges and crossed frequently and indiscriminately by other ridges or carinae; wings rounded distally, the outer brown band extending below to the brachius; third joint of anterior tarsus three times as long as the second; fourth joint a little more than half as long as the first; outer claw of chela reaching nearly to the base of the inner one, with a minute tooth subapically and also with an equally small one basally; inner claw attached to the fourth joint at its apical one-fifth. Coloration of the legs as in *thoracicus* Fouts.

Occurs at Carlisle, Pennsylvania. (Robert Fouts, July 21, 1920, one specimen.)

A correction should be made in the author's paper referred to above (Fouts, 1922, p. 632.) On the second line at the top of the page for "posterior" read "anterior."

Family SCELIONIDAE.

Hoplogryon similis, new species.

Female.—Length 1.00 mm. Closely related to *crassicornis* Kieffer. The fourth tergite is faintly reticulated basally and this character serves to distinguish the species. *H. crassicornis* has the tergites following the third bare and shining. Kieffer's description (Berl. Ent. Zeit., vol. 50, p. 262), with the exception noted above and one other, noted below, fits the present species very well. The author has, however, omitted the discussion of several characters of interest. These are as follows: thorax as wide as long, finely and rather densely pubescent above, bare laterally and below; abdomen as wide as the thorax; its length is

to its width as five is to three; second tergite provided with about a dozen deep longitudinal grooves extending to a little past its middle; there is nothing suggesting raised carinae as is the case in *longipennis* of Ashmead; the length of the anterior wing is to the length of the abdomen as eight is to five. The very short radius is situated slightly anterior to the apical third of the wing.

Occurs at Ames, Iowa. (Phillip Spong, January 20, and February 19, 1923, three specimens.) Type and paratype in collection U. S. N. M., Cat. No. 26833. Paratype in collection Fouts.

Leptacis obscuricornis, new species.

Female.—Length 1.55 mm. Related to *americanus* Ashmead from which species it differs in having the fourth antennal joint shorter than the pedicel. Head less than twice as wide as long, deep behind the eyes, the cheeks wide, oblique; frons, vertex and occiput faintly reticulate; antennae rather stout; pedicel longer than the fourth joint, the latter longer than the third; fifth joint about half as long as the fourth, a little longer than the sixth; seventh joint wider than the pedicel, twice as wide as the fourth joint, longer than wide; eighth joint shorter, a trifle wider than long; ninth still shorter, as wide as the eighth; tenth a little longer than the seventh, not quite twice as long as wide, blunt apically; thorax smooth and shining, without sculpture, sparsely pubescent; notauli absent; scutellum hump-like basally, its dorsal surface considerably higher than that of the mesonotum; spine extending to the apex of the propodeum, far above it, however, its apex sharply pointed; length of thorax 55, width 33, height 38; abdomen a little longer than the thorax, not quite twice as long as wide, without sculpture of any sort; the length of the second tergite is to its width as four is to three; base of scape yellowish; legs brownish, the coxae, femora and tibiae, apically, darker; tarsi and tibiae (except at apex), yellow.

Occurs at Ames, Iowa. (Phillip Spong, November 25, 1922, two specimens.) Type in collection U. S. N. M., Cat. No. 26834. Paratype in collection Fouts.

Family CALLICERATIDAE.

Calliceras pallidipes, new species.

Female.—Length .79 mm. Differs from description of *fusciceps* (Ashmead, Monogr. Proct., p. 125) as follows: head uniformly dark brown; ninth antennal joint slightly wider than long, tenth a little over three times as long as the ninth.

Apterous; head finely reticulate; mandibles and that part of head around mouth pale yellow; scape, pedicel, legs, thorax (except propodeum) and abdomen (except apical half dorsally and laterally), pale yellow; flagellum dark brown, gradually incrassated, the last joint acute, a trifle over three times as long as wide; abdomen one and one-half times as long as wide, a little longer than the head and thorax united, finely striate at base.

Occurs at Glen Echo, Maryland. (Robert Fouts, July 11, 1923, one specimen.)

Calliceras fasciata, new species.

Female.—Length .854 mm. Runs in Kieffer's key (Das Tierreich, Lief. 42, 1914, p. 79), to *pallidiventris* Ashmead. The pedicel in *fasciata* is about twice as long as the third antennal joint. (See Ashmead Monogr. Proct., p. 126.) Head, thorax and greater part of abdomen dark amber-colored; scape and legs yellow; pedicel somewhat darker; flagellum piceous; abdomen below yellow, laterally yellow to reddish yellow. Thorax and head finely and rather closely covered with short decumbent white hairs; length of head 15, width 25, height 24; pedicel about as thick as the fifth joint; joints three and four equal, as long as wide; five wider, transverse, a little longer than the fourth; six slightly longer and wider than five; seven wider, as wide as eighth but somewhat shorter; eighth and nine subequal, nearly twice as wide as long, as wide as ten; ten about as long as eight and nine united, conical, acute apically; length of thorax 27, width 21, height 23; median line on mesonotum faintly impressed; length of abdomen 35, width 20, height 21; length of second tergite 24; wings with a more or less distinct fascia medially; radius bow-shaped, shorter than the marginal vein, a little more than its own length distant from the apex of the wing.

Occurs at Glen Echo, Maryland. (Robert Fouts, August 21, 1917, two specimens.) Paratype in collection U. S. N. M., Cat. No. 26835. Type in collection Fouts.

Family DIAPRIIDAE.

CRACINOPRIA, new genus.

Runs to *Ashmeadopria* in Kieffer's key (Das Tierreich, Lief. 44, 1916, p. 11), and differs from that genus in having lateral processes on the propodeum and in not having a median carina on the propodeum which appears triangular when viewed from the side. Also the marginal vein is not obviously cuniform.

Head transverse, the rather prominent frontal ledge causing it to appear globose, smooth and shining, as is the entire body; frontal ledge rounded or emarginate above (in those species having the latter character the free plate part is much less in evidence and the depression behind becomes shallow and inconspicuous, without a longitudinal carina (*crassicornis* and *emarginata*); face below ledge flattened, smooth; clypeus truncate apically; antenna (in female) rather stout, 12-jointed; joints 4–9 of about equal width, transverse (or at least not longer than wide); terminal three joints forming a club (sometimes distinguished more by the lengths of its several members than by their widths); antennae (in male) rather long, 14-jointed, filiform, and covered with short hairs; fourth joint enlarged toward the apex, longer than joint three, sometimes deeply emarginate below; joints 7–13 moniliform; eyes rather small, oval, bare (eyes larger and apparently with a few scattered hairs in *emarginata*); mandibles bidentate, the lower tooth slightly the longer (not observed in *marylandica*); thorax less than twice as long as wide, about as wide as high, more than half as long as the abdomen, narrower than the head (except in *emarginata*); thorax polished, without sculpture except on the propodeum; pronotum visible from above, with rounded angles (except in *marylandica* and in *perplexa*, the

latter species having these parts particularly bluntly angulate); mesonotum transverse, with traces of notauli; scutellum with a median longitudinal ridge (*emarginata* and *crassicornis*) or with an indication of such a ridge posteriorly; metapleura and propodeum laterally pubescent; propodeum short, produced posteriorly on each side into a linguiform process; these processes pubescent laterally (except in *perplexa* and *marylandica*); the upper face of the propodeum is very short (*marylandica*) or practically absent, only the inclined posterior face being present; abdomen less than twice as long as the thorax, wider than the head or thorax, twice as long as wide (*crassicornis*) or less than twice as long as wide; wings ciliate marginally, in *emarginata* slightly longer than the combined lengths of the head, thorax and abdomen; marginal vein short, truncate apically, situated (in *emarginata*) at one-fourth of the wing's length from the tegula.

Genotype.—*Trichopria marylandica* Fouts.

Table to Species.

1. Frontal ledge emarginate above ..... 2.
— Frontal ledge not emarginate above ..... 3.
2. Emargination shallow; body black ..... *emarginata*, new species.
— Emargination deeper; body brown, blackish in parts ..... *crassicornis*, new species.
3. Species larger, 1.76 mm; proportion 33.7 ..... *perplexa*, new species.
— Smaller, 1.20 mm; proportion 28.0 ..... *marylandica* Fouts.

The four species listed above fall into two apparently natural divisions. *C. perplexa* and *marylandica* agree in having the upper margin of the frontal ledge entire, in having the pronotum angulate anteriorly on the sides, in having only a trace of a longitudinal ridge on the scutellum, and in having the propodeal processes devoid of pubescence above and on the sides. The two species *crassicornis* and *emarginata* differ in every one of these particulars.

The proportions (see introduction) are: for *emarginata* 28.0, for *crassicornis* 30.7, for *perplexa* 33.7 and for *marylandica* 28.0.

Cracinopria emarginata, new species.

Male.—Length 1.41 mm. Scape about as long as the following three joints united; pedicel a very little longer than wide, subequal to joint seven; third joint about twice as long as wide, a little shorter and narrower than the fourth, longer but slightly narrower than the second; joints five to thirteen subequal, nodose, covered with rather long whitish hairs; joint fourteen a little longer than thirteen, conical.

Length of head 26, width 30, height 30; length of thorax 46, width 31, height 31; length of abdomen 55, width 35; length of second tergite 43.

Scape, pedicel, and legs, yellowish-brown; flagellum fuscous; body black.

Occurs at Hagerstown, Maryland. (Robert Fouts, September 17, 1915, one specimen, swept from wheat stubbles.)

Cracinopria crassicornis, new species.

Female.—Length 1.51 mm. Antenna clavate, the club three-jointed; scape as long as the joints nine to twelve united; pedicel globular, as long and as wide as the third joint, which is more or less triangular, a little longer than the fourth; joints four to nine about twice as wide as long, ninth a little longer; joints ten and eleven quadrate, distinctly wider than nine, very little shorter than twelve, the latter blunt at apex; all the flagellar joints (including the pedicels) thickly covered with rather long erect whitish hairs, those on the club joints shorter and more thickly distributed.

Length of head 24, width 30, height 30; length of thorax 42, width 26, height 28; length of abdomen 70, width 35; length of second tergite 43.

Legs bright straw-colored; antennae uniformly rather light reddish-brown; body dark reddish-brown.

Occurs at Hagerstown, Maryland. (W. R. McConnell, May 8, 1915, one specimen, swept from volunteer wheat.)

Cracinopria perplexa, new species.

Female.—Length 1.76 mm. Antennae lost; length of head 29, width 37, height 35; length of thorax 55, width 34, height 36; length of abdomen 75, width 43; length of second tergite 50.

Legs yellow, tinged with brown; thorax reddish-brown; abdomen the same color but darker, almost black on the second tergite.

Occurs at Hagerstown, Maryland. (P. R. Myers, September 21, 1914, one specimen, swept from wheat stubbles.)

Cracinopria marylandica (Fouts).

Trichopria marylandica, R. M. Fouts, Proc. Ent. Soc. of Washington, vol. 22, 1920, p. 62.

Following measurements made from paratype retained by the author; length of head 23, width 28, height 28; length of thorax 35, width 23, height 23; length of abdomen 50, width 32; length of second tergite 35.

Occurs at Hagerstown, Maryland. (H. L. Parker, July 31, 1915, four specimens, reared from a dipterous puparium.)

Ismarus americanus, new species.

Female.—Length 2.0 mm. Runs in Kieffer's key (Das Tierreich, Lief. 44, 1916, p. 354) to *halidayi* from which it differs in having the fourth antennal joint longer than the third and in not having a sharp ridge traversing the scutellar fovea.

Length of head 30, width 55; length of third antennal joint to length of fourth, as two is to three; third very little shorter than the first; antenna gradually thickening distally, the joints becoming shorter to the seventh; joints seven to fourteen subequal in length, the fourteenth a little the longest; length of thorax 75, width 45, height 55, densely pubescent where the surface is roughened, e. g., the upper and lower parts of the pronotum and propodeum; these parts rugose, especially the dorsum of the pronotum; mesosternum punctate,

more densely pubescent than the rest of the thorax; propodeum rugose, reticulate, areolate, with a high and sharp transverse ridge; hair on propodeum as long as that on the first segment of the abdomen but more dense; metapleurum rugose, densely pubescent; length of abdomen 85 (recurved apically), width 50, height 40, highly convex above, less so below, sparsely pubescent, shining and without sculpture (with the exception of the first segment which is furnished with irregular longitudinal carinae or ridges); length of first segment 14, width 19; length of second tergite 55; base of segment strongly fluted, the length of the deep median groove 33; the sutures separating the segments two to five from one another extremely fine and hard to trace; the suture between tergites five and six and that between six and seven are deeper, the latter being virtually a constriction; seventh tergite triangular, as long as wide, pointed apically.

Black; antenna brownish, lighter basally, the proximal three joints stramineous below; legs bright golden-yellow, with the following exceptions: most of tibia and femur of hind leg and last joint of tarsus of hind leg, brown; last tergite, and fifth and sixth narrowly laterally, and sternites three to six, brown or yellowish-brown.

Occurs at Carlisle, Pennsylvania. (Robert Fouts, July 23, 1920, one specimen.)

Acropiesta semirufa, new species.

Female.—Length 3.0 mm. Differs from *subaptera* in having fully developed wings. Scape yellowish-brown, as long as the following four joints united; third joint longer than the pedicel, as long as the fourth and fifth united, not quite twice as long as wide; joints four and five subequal, quadrate; six and seven as long as five but a little wider; following joints transverse; fifteen slightly longer than three, less than twice as long as wide, rounded apically; flagellum brownish, darker than the scape; marginal vein punctiform, half as long as the first radial abscissa, the latter oblique, one-third the length of the second abscissa; cubitus slightly curved proximad; petiole rugulose, cylindrical, distinctly less than twice as long as wide; legs yellow; femora and tibiae stout, clavate; abdomen slightly depressed, elliptical, one-half longer than the thorax, pointed at tip; segments three to seven subequal; seven as long as the three preceding united; head, thorax and basal two-thirds of abdomen, reddish-brown; abdomen apically yellowish.

Occurs at Glen Echo, Maryland. (Robert Fouts, one specimen.)

Anectata canadensis, new species.

Female.—Length 2.94 mm. Differs from *hirtifrons* Ashmead in having the scape a little less than twice as long as the third antennal joint.

The lengths of the antennal joints are as follows: 38, 10, 20, 15, 14, 14, 13, 13, 12, 10, 10, 9, 9, 14; all of the joints are subequal in width (about 8); length of thorax 100, width 68, height 75; length of abdomen 120, width 65, height 45; length of first segment 30, width 20, height 17; length of second tergite 90; abdomen moderately thickly covered with long white hairs; first tergite with five straight longitudinal ridges above, the distance between each of them being

about 5; second tergite with a deep longitudinal groove basally (length 25) and with a number of shorter grooves on each side of the central and larger one; that part of the abdomen posterior to the first segment is a perfect broad ellipse when viewed from above; the seventh segment is as long as the four preceding united, as wide as long, triangular, acute at apex; length of basal vein 28, of marginal vein 20, of the first abscissa of the radius 10, and of the second abscissa 45; radial cell closed; wings slightly tinged with brown; antennae rufous, becoming darker towards the apex, the terminal joints black; legs entirely rufous; body black.

Occurs at Gull Lake, Ontario. (H. S. Parish, June 13, 1921, one specimen.)

A NEW SPHINGID FROM NEVADA (LEPID.).

By Wm. Barnes and F. H. Benjamin, *Decatur, Illinois.*

Hyloicus gerhardi, new species.

Frons, and vertex whitish grey. Thorax similar, marked by black. Tegula with a heavy black edge. Abdomen grey, dusted with black, with usual black dorsal line, and white and black lateral patches. Fore wing: ground color whitish grey, suffused and dusted with black; a strong black shade below cell; black dashes in the interspaces between veins 2–3, 3–4, 5–6; a bent black apical dash from near vein 6; a wide strong inwardly oblique subterminal black line between veins 6–2, distally marked by whitish shades and indeterminate lines; fringes grey, marked with some white, but not checkered. Hing wing with median whitish band and basal whitish area, else black except for a gray outer margin; fringes pale grey, composed of black and white scales, but not regularly checkered. Beneath: fore wing grey, with only the apical mark distinct, fringes white, grey tipped, appearing faintly checkered due to a few black scales at the extremities of the veins: hind wing and its fringes, as on upper side.

Expanse.—♂ 74–80 mm.; ♀ 75–88 mm.

Allied to *vashti* Stkr., with a similarly pale thorax. Differs by its more general powdery appearance, lack of brown tones, usually stronger black line between veins 6–2, and by the thoracic vestiture which is composed of somewhat wider hair-like scales and presents a rougher appearance.

Types.—In Barnes collection; Paratypes in U. S. and Canadian National Museums, Field Museum, Tring Museum, and Clark collection.

Type localities and number and sexes of types.—Holotype ♂; Allotype ♀, 4 ♂, 13 ♀ Paratypes, Clark Co., Nev., 24–30 June; 3 ♂, 13 ♀ Paratypes, Las Vegas, Nev. (R. A. Eignor); 1 ♀ Paratype Charleston Mts., Southern Nevada (O. C. Poling).

We take pleasure in naming this species in honor of our friend Mr. William Gerhard, who brought us the type of *vashti* for comparison.

NEW PTILIIDAE RELATED TO THE SMALLEST KNOWN BEETLE.

By H. S. Barber, *U. S. Bureau of Entomology.*

Seventy years ago a Russian traveling in the United States collected a colony of microscopic beetles in a fungus in Georgia and no coleopterist appears to have found the species since. It was described as one-tenth line (a hundred-twentieth part of an inch) in length, and about one-fourth as wide. But although the writer has never seen a specimen of this species it can probably be found by any one who has the patience and vision to search for it in the Southern States, now that habits of certain related species described below offer the clue.

The present paper results from the receipt at the National Museum of a small vial containing fifty minute beetles and four larvae, supposed to be their young, from Dr. A. Dampf in the Federal District of Mexico, who believed them to be the smallest of all kinds of beetles. In this he is very nearly right, for although two or three slightly smaller species are below described, its length of just over a half millimeter is accompanied by the most slender and cylindrical body-form yet known in the family, measuring only about one-tenth millimeter in greatest diameter. These specimens were found in a "Polyporus" fungus (determined by Dr. J. R. Weir as *Fomes pinicola* (Swendener) Ckl.) growing on *Abies religiosa* in the Desierto de los Leones, Distrito Federal, Mex., at an altitude of nearly eleven thousand feet, and although no information was sent describing how it lived in the fungus, its extreme form strongly suggests specialization for life in the vertical spore tubes, and its coloration (clear yellow with the head black), suggests that it sits in the tubes, head downward, and nearly flush with the under surface of the fungus. The larvae, on the contrary have the tail-end infuscate and strongly armed, suggesting that it assumes the reverse position in the spore tube. Among the beetles in the vial was a unique example of a distinct but related genus (figured on plate 8, fig. 4–6 as *Mycophagus? robustus*) which raises doubts whether the four larvae belong to this species, or to the much narrower and more abundant beetles illustrated on plate 7 as *Cylindrosella dampfi.*

A sample of fungus later submitted by Dr. Dampf for identification displayed a number of dead beetles and larvae adhering to the under surface or in the spore tubes where they had apparently crawled to die as the fungus dried. There were also specimens of a remarkable predaceous Gamasid mite of such diameter and extreme elongation as to suggest adaptation to the form of the spore tubes. It should be remembered that these fungi are perennial and that the residence of a colony of beetles within a single fruiting body might well persist for a number of years.

So little is known about the "smallest beetle" that we can not accept the statements of the various writers who have discussed it as all referring to the same species. Eight papers[1] by five authors consider this species, recording four widely separated localities (Mobile, Ala., Georgia, Guatemala and Cincinnati, Ohio), which seem to the writer to indicate three distinct species confused under this name. Colonel Victor Motschoulsky collected specimens in a fungus either at Mobile, Ala., or in Georgia, but his letter of July 15, 1854 (See Etudes Entom. 1856, pp. 6–12), does not mention microscopic beetles although he describes collecting at Mobile and Atlanta and mentions beetles in fungi at the latter place. The same letter describes his visit in Philadelphia with LeConte who nine years later (1863) described this most minute beetle under the name *Ptilium fungi* as from Mobile, collected and given him by Motschoulsky. Five years later, 1868, Motschoulsky described what we must assume to be the same species as a new genus and species, *Nanosella fungi*, without citing LeConte's description, and recording its source as Georgia, so it would appear that Mobile was an erroneous record in the LeConte paper. It seems that Motschoulsky's types have never been re-examined, but a broken specimen from the LeConte collection was studied by Matthews who described and figured it in 1872 and 1884. The descriptions and figures by this same student (Matthews) in 1888 and 1900 are based on a specimen from Alta Vera Paz in Guatemala. The latter figures differ greatly in the shape of the scutellum and most probably represent an unnamed species, which being so well described should receive a new name (*matthewsi*, new species). For comparison the writer reproduces herewith copies of Motschoulsky's 1868 figures of *Nanosella fungi*, Matthews's 1872 figure of *Ptilium fungi* LeConte 1863 and Matthews's 1900 figure of the Guatemalan specimen (*matthewsi*).

No other collector in the United States seems to have observed these beetles except Charles Dury at Cincinnati, Ohio, who has encountered two colonies each representing a new form. In July, 1907, he noticed a great number of these microscopic beetles running on the under surface of a fungus (*Polyporus cuticularis*) growing on the under side of a small beech log, and by carefully cutting off the fungus and jarring it over his collecting bottle he secured more than fifty specimens which he identified from Matthews's 1884 paper as *Nanosella fungi*, and from which he distributed samples to numerous coleopterists. This determination remained unquestioned until the present time but a new generic and specific name (*Throscoptilium duryi*, see plate 8, figs. 12–14) is now proposed because his speci-

[1]References are given in the list of works cited.

mens differ so greatly in outline, form of head, pronotum, scutellum, etc., from Matthews's 1872 figure. Seven years later, July, 1914, another colony of about 25 beetles behaving like those previously caught was found upon a different fungus, *Poria cinerea*, on an elm log, but of these Mr. Dury was only able to secure eleven specimens which he described as *Nanosella atrocephala* in 1916. One of his cotypes is here figured on plate 8, figs. 7–9, and the writer has recently obtained a broken specimen, apparently this species, from a specimen of the same species of fungus that had been collected in Louisiana in 1889 by A. B. Langlois. Another species differing from all others in being much darker in color was found in a "Polyphorus" in Panama by Mr. James Zetek in July, 1923, and is below described as *Mycophagus? panamensis* (see plate 8, figs. 10–11).

Having assembled this material and information and recognized that they represent a probably extensive group of species adapted to live in spore tubes of fresh, growing Polypore fungi, the writer was pleased to find the short but remarkable record by Dr. Friedenreich, 1883, which had been overlooked by Matthews but added by the editors of his posthumous Supplement (1900, p. 7). Friedenreich tells of examining a freshly grown cinnabar red Hymenomycete at Blumenau, in the state of Santa Catherina, Brazil, and observing a "dust small" insect issue from one spore-tube, investigate the surrounding surface and disappear into another spore-tube. Unable to recognize its order he hastened home and with the aid of a small brush preserved the entire little colony of beetles which he described as a new genus and species, *Mycophagus biclavatus*, and this generic name is here applied to several of the species.

The question of wide geographical distribution of a minute species of insect has often caused comment and is a phenomenon too easily dismissed for lack of data or by assuming commercial transportation, or misidentification of material from extreme localities. But all that might be needed to acquire great geographical distribution would be utilization of wind transportation as spores are scattered. The remarkable ciliate wings of these beetles suggest the passive function of the ciliae of downy seeds and although great difficulties are in the way of observing more than the start of their flight the writer believes them incapable of more than short flights by their own power. Supposing, however, that in a given species a sufficient percentage of the fertilized females instinctively rose in the air a few feet above the vegetation, then rested for a time with their ciliate wings expanded in the position in which many Ptiliids die, and on again alighting could find proper environment for their young—we might expect such a species in time to be carried by

air currents[1] throughout its possible habitat. But in the Nanosellini such survivors would be few, for instead of feeding on fungus spores in general as suggested by Flach's 1889 remarks on the contents of the intestine, the forms here treated appear specialized for devouring the soft, growing spores in particular species of fungi.

NANOSELLINAE, new subfamily

The species here considered appear thus to form a group closely related to each other in such structures as pertain to their dependence upon supposedly unripened spores of Polypore fungi, and abundantly distinct from other generalized Ptiliids by a number of characters such as: the more elongate form; shorter, stouter antennae, which rarely extend behind the middle of the pronotum; obliquely truncate elytra more or less rounded at apices due to convexity but exposing a declivous area on pygidium and propygidium which is surrounded by a ring of stiff hairs; and the curved anal spine of varying shape protruding from beneath the apex of the pygidium in both sexes. In view of these characters and their incompatibility in the recognized groups of Ptiliidae it appears necessary to consider the species as constituting a new subfamily, the NANOSELLINAE. The larva figured on plate 7, figs. 10–12, differs from the few other known Ptiliid larvae most prominently in its strong armature of the ninth tergite.

The forms now known to belong to this subfamily are included in the following very imperfect key; those whose characters are stated only on the authority of other students being indicated by an asterisk.

1. Size minute, one-fourth millimeter or less, form parallel ..... 2.
   Size larger, 0.4 to 0.7 mm., form oval (except in *Cylindrosella*) ..... 3.
2. Head and scutellum elongate. Georgia (?Atlanta) (vide Matthews 1872) *Nanosella fungi* (LeConte)*
   Head transverse, scutellum equilateral, Guatemala, (*N. fungi* Matthews 1900 not Lec.) ..... *Nanosella matthewsi* n. sp.*
3. Form cylindrical, very elongate, five times as long as wide, pronotum longer than wide, with sides parallel, scutellum elongate; length 0.6 to 0.7 mm. Federal District, Mexico ..... *Cylindrosella dampfi* n. sp.
   Form more oval and longitudinally more convex; pronotum transverse, narrowed anteriorly ..... 4.
4. Mesosternal carina forming a spearhead-shaped area with the acute apex between mesocoxae and with short, feeble median carina in front; body form elongate oval. (*Mycophagus?*) ..... 5.

[1] Great numbers of a minute beetle, *Orthoperus glaber?* were encountered on the railing at the top of the Capitol dome, 280 feet, Washington, D. C., Oct. 10, 1911, under conditions that suggested their migration in the strong warm wind that was blowing from the southeast. An area of the railing was brushed clean and during our short stay several more specimens were found within the area but in such a wind it was impossible to see such minute things flying.

Mesosternum very prominent, strongly compressed anteriorly into an abrupt carina with deep lateral cavities for reception of front coxae and legs, the median part inflated into an oval lobe which is produced backward in a thin, horizontal, parallel-sided plate overlying inner third of mesocoxae and meeting an elevated, anteriorly truncate process from the metasternum, similarly covering part of the mesocoxae (*Throscoptilium* n. gen.) ..... 8.

5. Color golden yellow, elytra rough with deep punctures, length 0.6 mm., width, 0.2 mm., Brazil ..... *Mycophagus biclavatus Fried.**

Occiput all or partly piceus ..... 6.

6. Occiput somewhat infuscate, the head darker near eyes, form narrower and more constricted at humeri, pronotum widest before base, length 0.42 mm., width 0.15 mm., Cincinnati, Ohio, in *Poria cinerea* (*Nanosella atrocephala* Dury..) ..... *Mycophagus atrocephalus* (Dury).

Occiput entirely black, form more robust, pronotum widest at base ..... 7.

7. Color pale except head, form more elongate, larger; length, 0.60 mm.; width, 0.18 mm. Federal District, Mexico (Dampf) ..... *Mycophagus robustus*, n. sp.

Castaneous, except elytral margin and apex, pronotum and parts of venter paler, head black, form more depressed; length 0.45 mm., width 0.17 mm. Canal Zone, Panama ..... *Mycophagus panamensis*, n. sp.

8. Form short and stout, very robust anteriorly; pronotum almost semicircular; length, 0.42 mm.; width, 0.17 mm. Cincinnati, Ohio, in *Polyporus cuticularis* (*Nanosella fungi* Blatchley, Dury) ..... *Throscoptilium duryi*, n. sp.

Nanosella fungi (LeConte) Mots.

As above stated this species is unknown to the writer and for the present we must assume that *Ptilium fungi* Le Conte 1863 and *Nanosella fungi* Motschoulsky 1868 are identical and probably from the same capture at Atlanta, Georgia; also that the differences in outline between the figure by Motschoulsky and Matthews's 1872 illustration of a LeConte specimen are artist's errors in interpretation of form. LeConte states the length as "—scarcely more than 1-100 of an inch," Motschoulsky as "—hardly one-tenth ligne—" and Flach, 1889, as "—of only 0.2 mm. length—" all remarking upon the species as the smallest known beetle. Thus the copy of Motschoulsky's figures here reproduced (pl. 8, fig. 2) is slightly too small and the outline (redrawn entire from the half outline by Matthews, 1872), of the LeConte specimen shown beside it (pl. 8, fig. 1) is slightly too large for the 100 diameter enlargement intended.

The two original descriptions are here translated:

LeConte 1863, "—most minute, linear, testaceous, punctulate pubescent, thorax slightly shorter than wide, sides broadly rounded, elytra elongate, apices rounded, antennae and feet yellow. Mobile; Col. Motschulsky."

Motschulsky 1868, "Form elongate, narrow, almost parallel; elytra more than three times as long as pronotum and a little dilated behind, pronotum

without impressions, almost square and a little narrowed towards the head which is moderately small, posterior angles slightly obtuse; antennae short not passing base of pronotum, eyes distinct, punctuation very fine, pubescence invisible. Form recalling the narrow Atomarias. Color yellowish white, eyes black. Georgia in America. Inside a fungus."

Nanosella matthewsi, new name.

Nanosella fungi Matthews 1888 and 1900—Not LeConte.

Believing the habitat of LeConte's species not likely to extend from Atlanta, Ga., to Vera Paz, Guat., and desiring to avoid the misleading inference that Matthews's 1900 figure of the latter specimen represents the structure of the genotype, a new name is here proposed based upon the latter figure and supported by the differences from the 1872 figure of *fungi* by the same author. The type is of course the single specimen found by Mr. Champion at San Juan in Vera Paz, Guat., and now assumed to be in the Godman & Salvin Collection in the British Museum. The differences have been mentioned in the table of species. An error in interpretation of the mesosternal epimeron in Matthews's description and figure is suspected. His anterior suture arising from the external anterior part of the coxal cavity coincides with what appears to be a muscle attachment inside the body and is not a suture in the forms here studied.

CYLINDROSELLA, new genus.

The elongate cylindrical form of the genotype (*C. dampfi*, new species) so lengthens all parts of the body that the recitation of contributive details such as elongate pronotum, scutellum, pro-, meso-, metasternum, etc., shown in the figures (plate 7), is unnecessary, but the inclusion of this linear species among the ovate species here doubtfully assigned in *Mycophagus* appears equally unwise. In addition to the characters in the table the following may be useful.

Cylindrosella dampfi, new species.

Head large, subglobular, shining, black, impunctate; eyes lateral, very coarsely facetted; front strongly convex; labrum prominent, laterally compressed into a vertical prominence above the tips of the maxillae; antennae 11-jointed with laterally compressed three-jointed club. First joint large, subglobular; 2d as long as first but slightly narrower, cylindrical, slightly curved; 3d less than half as wide, cylindrical, as long as 2d; 4th and 5th short, together nearly equaling 3d; 6th, 7th and 8th larger, increasing in width, the 6th subglobular, the 8th twice as wide as long; 9th hemispherical, twice as wide as 8th; 10th shorter than wide; 11th conical, short. Maxillary palpi (pl. 7, fig. 4) with first joint small, second strongly pear-shaped and constricted near base, twice as long as first, third a little longer than second, and a third wider, subglobular or subquadrate,

fourth as long as third, very narrow, cylindrical, slightly curved. Rest of body yellow, sparsely clothed with decumbent hairs arranged in series on pronotum and elytra; the abdominal sternites except the first and last without hairs other than a single row on posterior margin of each, reaching nearly across the following segment. Pygidial spine a thin, narrow, apically emarginate process.

Type, *allotype* and *paratypes*.—Cat. No. 22993 U. S. N. M.

In the figures (pl. 7, figs. 1–3) the abdomen is more distended than in any of the dried specimens in which the propygidium is usually withdrawn under the elytra.

Described from 7 slides (9 ♂, 6 ♀) and 33 dry specimens (sexes not determined) from *Fomes pinicola* on *Abies religiosa* at 3200 meters altitude, Desierto de los leones, D. F. Mex., found by Dr. A. Dampf in whose honor the species is named. Two paratypes are in the Dury Collection.

Mycophagus biclavatus Fried. (1883).

This species is unknown to the writer but it seems probably congeneric with *Nanosella atrocephala* Dury and the two species here described as new. *Mycophaga* Rond. 1856 (Anthomyidae) does not appear to invalidate the present generic usage. Friedenreich does not mention the pronotum nor mesosternum, and the mouthparts which he so carefully describes are not sufficiently displayed in the species before me. His description of the antennae needs correcting in that what he calls third and fourth joints may be considered the articulating basal part and the exposed principal parts of the third joint. This requires renumbering the following joints, making his apical appendage of his eleventh joint the reduced eleventh joint. The recorded habits have already been mentioned and the description need not here be quoted.

Mycophagus? atrocephalus Dury (1916).

Two of Dury's cotypes have been examined, one of which unfortunately vanished while being studied. The remaining specimen has been remounted in balsam for safer preservation, and is sketched on plate 8, figs. 7, 8, 9. A third cotype kindly sent by Mr. Dury to replace the loss, shows the occiput almost black. The statement in the original description regarding widely separated hind coxae may be misleading as they are only slightly separated as in the other species. The middle coxae are apparently separated by the produced tip of the mesosternal spathula which overlies their internal margins, suggesting approach to the structure of this part in *Throscoptilium*. The metasternal carinae are strongly convergent posteriorly and longer than in the other species. The specimen is a ♀ vaguely showing a large oval mass (shaped as in fig. 9, plate 8)

within the last sternite but so feebly chitinized that it is uncertain if it is the receptaculum seminis or a mature ovum. The length given as half a millimeter is also slightly too large, the cotype measuring 0.42 mm. in length and 0.15 mm. in width.

Type locality Cincinnati, Ohio. Host fungus *Poria cinerea*.

Two cotypes in the National Collection, no. 26801 U. S. N. M.

Examination of the dust brushed from an herbarium specimen of this species of fungus collected in Louisiana thirty-five years ago (Jan. 21, 1889) yielded a specimen believed to be this species although the head and prothorax are missing. It is a male with the aedeagus close to one side and much as in Cylindrosella (Plate 8, fig. 6) and no noteworthy differences from the cotypes are observed.

Mycophagus? robustus, new species.

(Pl. 8, figs. 4–6.)

Elongate oval, moderately depressed, pale testaceus except the infuscate head; body widest at middle, less than one-third as wide as long; eyes rather large, sublateral; front polished, piceus, strongly convex. Pronotum transverse, sides nearly straight, strongly convergent, base and apex broadly arcuate; a faint transverse marginal groove before base. Scutellum nearly equilateral, slightly elongate. Elytra twice as long as wide, translucent yellow showing the two masses of alar hairs as short median vittae. Mesosternum with short median carina anteriorly, the spear-head shaped median area twice as long as wide with the acuminate apex passing as a microscopic septum between mesocoxae and meeting a short similarly fine carina on the metasternum. Metasternum two-thirds as long as wide; postmesocoxal carinae short, arcuate, posteriorly convergent.

Length, 0.60 mm., width, 0.18 mm.

Type.—Cat. No. 26994 U. S. N. M.

Described from a single male specimen received in the same vial with nearly fifty specimens of *Cylindrcsella* collected from a "*Polyporus*" on *Abies religiosa* at 3200 meters altitude, Desierto de los Leones. D. F., Mexico, collected by Dr. A. Dampf.

This is the largest species of the group before me and is nearly the size, form and color of the genotype (*biclavatus*) whose only known locality is approximately five thousand miles distant. It is similar in form, sculpture, and vestiture to *M. atrocephalus* but the form of the mesosternum has not been so adapted to receive the front coxae when the pronotum is deflexed.

Mycophagus? panamensis, new species.

(Pl. 8, figs. 10, 11.)

Elongate oval, depressed, castaneous, the tip of the abdomen, under side of head and prothorax and the appendages testaceous. Pronotum nearly as long as wide, sides feebly arcuate, strongly convergent. Scutellum large, wider than ong, apex produced. Elytra but slightly wider than base of pronotum, widest

before middle, sides feebly arcuate, apices sub-conjointly rounded; disc with sparse coarse black spots (punctures?) irregularly arranged in series. Mesosternal spathula two-thirds as wide as long, apical angle about 70°. Receptaculum semenis small, spiral, as indicated in fig. 11.

Length, 0.45 mm., width, 0.17 mm.

Three specimens (two females in balsam, one imperfect specimen dry) collected in a "*Polyporus*" on the Rio Indio in the Canal Zone, Panama, Aug. 27, 1923, by Mr. James Zetek. (No. 2256.)

Type and *paratypes*.—Cat. No. 26995 U. S. N. M.

Throscoptilium duryi, new species.

(Pl. 8, figs. 12–14.)

Fulvous except black head, thickly clothed with long, decumbent pubescence which is arranged in irregular transverse series. Body stout, widest at base of pronotum which is semicircular. Elytral margins feebly arcuate and convergent, posteriorly broadly rounded. Head nearly vertical, black. Antennae passing middle of pronotum, the club narrow with penultimate joint cylindrical, and longer than wide. Metasternum half as long as wide, the postmesocoxal carinae strongly convergent and nearly reaching the middle of posterior margin. Abdomen short conical, greatly retracted in most specimens, the receptaculum semenis a globular, feebly chitinized mass within the last segment (fig. 14), much as in *atrocephalus;* the aedeagus short, stout, arcuate and slightly constricted before apex.

Length, 0.42 mm. (0.48 mm. distended from KOH), width, 0.18 mm.

Type, *allotype* and five *paratypes*.—Cat. No. 26996 U. S. N. M., all but two paratypes preserved in balsam. Four paratypes on card points returned to Mr. Charles Dury.

Described from eleven specimens from a large series taken by Mr. Charles Dury near Cincinnati, Ohio, from a fungus, *Polyporus cuticularis*, growing on the under side of a small beech log, July 18, 1907. Mr. Dury writes that they were clustered on one patch of fungus, running over its surface but not going off onto other surfaces. He cut the fungus off and took it home where on the 23d a few more specimens were jarred from it. On the same log was living a colony of *Microsternus* (*Megalodachne*) *ulkei* Cr. which Mr. Dury informs me lives only upon this species of fungus.

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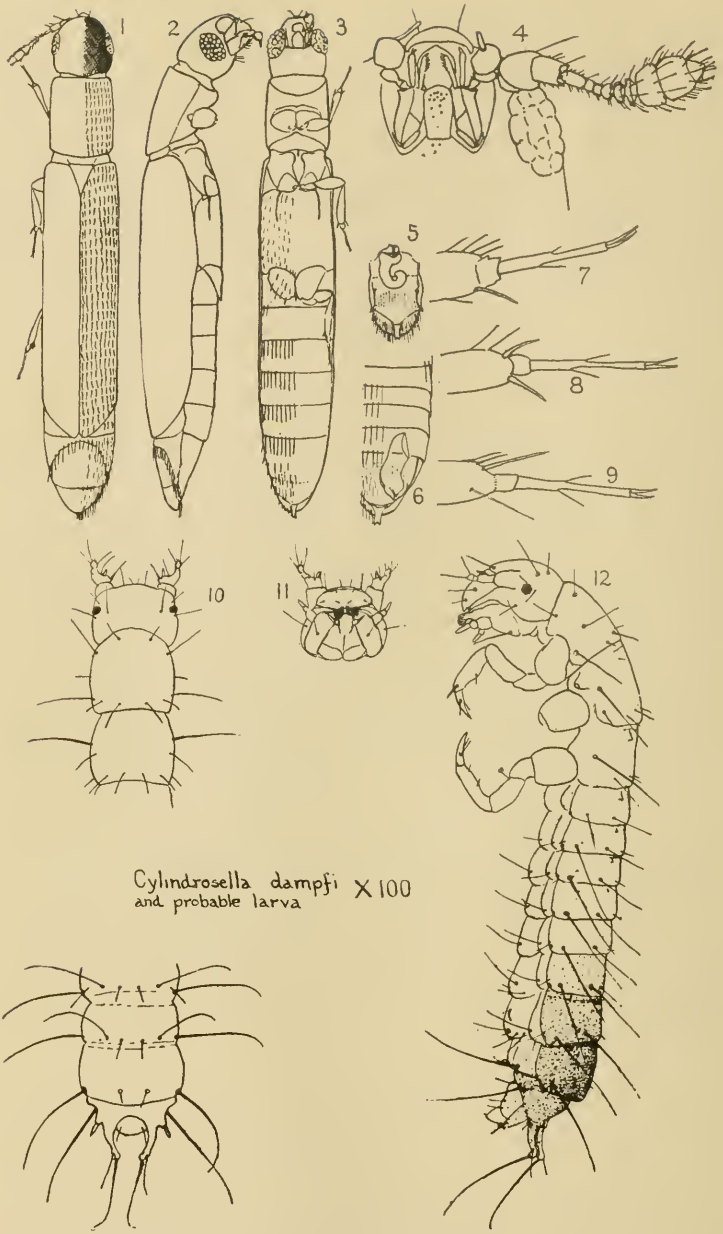
1863 LeConte.—New Species N. A. Coleopt. pt. 1, p. 62.—(Ptilium fungi)

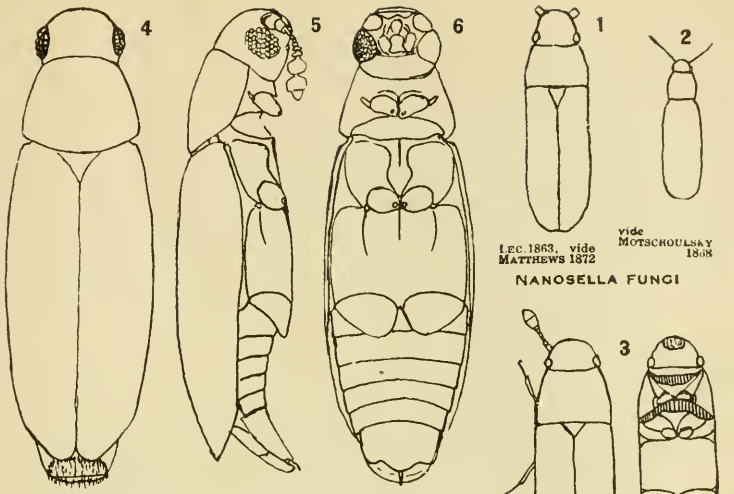
1868 Motschoulsky.—Bull. Soc. Imp. Nat. Moscow, vol. 41, pt. 2, p. 187, pl. 8, fig. 3.—(Nanosella fungi)

1872 Matthews.—Monograph Trichopterygia. pp. 19, 32 & 68, pl. 20, fig. 6. (Nanosella fungi Mots.) [LeConte]

1883 Friedenreich.—Entom. Zeitung. Stettin. vol. 44, p. 379.—(Mycophagus biclavatus)



Cylindrosella dampfi X 100
and probable larva



BARBER—NEW PTILIIDAE

1884 MATTHEWS.—Trans. Amer. Ent. Soc. vol. 11, p. 153.—(Nanosella fungi Mots)
1888 MATTHEWS.—Biol. Centr.-Amer., Coleoptera, vol. 2, pt. 1, p. 153.—(Nanosella fungi Matthews, not LeConte)
1889 FLACH.—Verh. Zool-Bot. Gesellsch. Wien., vol. 39, p. 486 & 488.—(food of family and mention of Nanosella)
1900 MATTHEWS.—Supplement Monogr. Trichopt. p. 107, pl. 13A.—(Nanosella fungi Matt. not Lec.)
1910 BLATCHLEY.—Coleopt. Indiana, p. 487.—(Nanosella fungi Blatchley not LeConte)
1916 DURY.—Journ. Cincinnati Soc. Nat. Hist. vol. 22, p. 14.—(Nanosella atrocephala)

EXPLANATION OF PLATES 7, 8.

Plate 7. *Cylindrosella dampfi*.

Figs. 1, 2, 3, dorsal, lateral, ventral of distended adult. x 100
4, antennae, maxillae and mentum more enlarged.
5, receptaculum seminis within detached last abdominal segment. x 100
6, aedeagus within ♂ abdomen. X 100
7, 8, 9, front, middle and hind tarsi, much enlarged.
10, probable larva, dorsal aspect of anterior and posterior ends of distended specimen. X 100
11, anterior aspect of head of same.
12, lateral aspect of contracted and slightly flattened larva. X 100

Plate 8. other Nanosellini. X 100.

Fig. 1, *Nanosella fungi*, redrawing from Matthews 1872 figure of LeConte's specimen.
2, same species (?), redrawn from figure by Motschoulsky 1868.
3, *Nanosella matthewsi*, dorsal and ventral, redrawn from Matthews's 1900 figures.
4, 5, 6, *Mycophagus? robustus*.
7, 8, 9, *Mycophagus? atrocephalus*.
10, 11, *Mycophagus? panamensis*.
12, 13, 14, *Throscoptilium duryi*.

CHANGE OF PREOCCUPIED NAME (DIP.).

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

Dr. F. M. Root kindly notified me that the name *Chrysops vitripennis* Shannon is preoccupied by *Nemorius* (*Chrysops*) *vitripennis* Meigen. The name *hyalinus* is proposed in its stead.

A NEW MITE FROM THE LUNG SAC OF A RATTLESNAKE.

By H. E. Ewing, *U. S. Bureau of Entomology, Washington, D. C.*

Dr. W. A. Riley, of the University of Minnesota, has found in the lung sac of a rattlesnake an interesting Dermanyssid mite which he has kindly sent to the writer for determination. The specimen sent proves to be a species of *Entonyssus*, a genus established in 1922 for a mite taken from the lung sac of a Pine snake which had died at the National Zoological Park. A description of the new species follows:

Entonyssus rileyi, new species.

Mouth-parts well developed. Chelicerae stouter than the palpi; fixed arm harpoon-like and extending beyond the movable arm by the width of ventral, distal process; movable arm stouter than fixed arm, almost straight, and with a rough cutting edge. Palpi extending to distal end of first femur; distal segment almost twice as long as broad, terminated by a slightly curved tactile seta and decidedly the smallest of the segments; penultimate segment longer than the antepenultimate, but not so stout.

Abdomen about as broad as long and broadly rounded behind; naked. Anus small and almost terminal. Anal plate very poorly chitinized.

Legs large, first and last pairs longer than the second and third pairs. Tarsus of leg I about one and a half times as long as tibia, of even width throughout and truncate at its tip; tibia I slightly longer and slightly narrower than patella I; patella I as stout as femur but much shorter. Tarsus II tapering, slender, twice as long as tibia II and with pseudo-joint near the base; tibia II subequal in length to patella II but not so stout. Tarsus IV very slender and tapering, the longest of all the tarsi and with a pseudojoint near the base; tibia IV as long as patella IV but not so stout. All the legs with sharp tarsal claws and conspicuous caruncles.

Length 1.16 mm.; width 0.58 mm.

Type host and type locality.—Rattlesnake, from Texas.

Type.—Cat. No. 23775, U. S. N. M.

Description based on a single specimen, the holotype, which is a female. Speaking of this mite Dr. Riley states: "I have finally obtained one and on closer examination have confirmed my suspicion that the mites were from the lung sac rather than from the body cavity. This last snake had a single mite, but it was in the lungs; and in the examination of the first specimen I subsequently found a single mite within the lung." This species differs from *E. halli*, the only other species of the genus, particularly in the shape of the chelicerae, the movable finger being stout and almost straight instead of being slender and falciform.

A NEW MOTH INJURIOUS TO COCOANUT PALM (LEPIDOPTERA: LIMACODIDAE).

By Wm. Schaus.

Natada urichia, new species.

Male.—Head, thorax and fore wing cinnamon drab; collar indistinctly mottled with some grayish hairs; abdomen slightly darker. Fore wing: costa suffused with light cinnamon drab; a whitish line from costa close to subterminal inbent to middle of inner margin, the subterminal vertical to vein 3, both lines proximally edged by a walnut brown line, the subterminal below vein 3 brownish, close to termen and almost obsolete; cilia drab crossed near base by a fuscous line. Hind wing cinnamon brown suffused with fuscous; cilia as on fore wing.

Female.—Wings faintly suffused with vinaccous, the lines further from apex. The male antennae are moderately pectinated as in *N. subpectinata* Dyar to which it is closely related, the latter species being smaller, darker, the frons and collar buff white, the vertex light ochraceous buff.

Expanse.—♂ 20 mm.; ♀ 24 mm.

Habitat.—Trinidad, B. W. I.
Type.—Cat. No. 27528 U. S. N. M.
Received from F. W. Urich.

AMBLYCORYPHA BRACHYPTERA BALL (ORTHOPTERA).

By A. N. Caudell, *U. S. Bureau of Entomology.*

In 1897[1] Dr. E. D. Ball published a record of an *Amblycorypha* under the specific name *brachyptera* Bruner. But that name was purely a manuscript one, as Bruner never described such a species. The only other mention in literature of this name is in Scudder's index to the Orthoptera published in 1901, where it is merely entered in an alphabetic list. The importance of this matter lies in the fact that in the article by Dr. Ball we find the statement that *brachyptera* has shorter wings than the two species immediately preceding it, these being *oblongifolia* DeGeer and *rotundifolia* Scudder. Thus he gave a structural character, which validates the species under rules of nomenclature at present in force. And, indeed, the character of possessing shorter wings than the other species mentioned in comparison is specific, and sufficient in itself to differentiate the species, though the identity is established with even more assurance by the examination of a topotype recently collected by Dr. Ball. It is the same species as that described by the present writer under the specific name *isleyi* in 1905.[2] Thus the specific name *isleyi* Cdll. falls into the synonymy under *brachyptera* Ball. As *isleyi* is a variety of *rotundifolia*, Ball's species will be known as *Amblycorypha rotundifolia brachyptera* Ball.

[1]Proc. Iowa Acad. Sci., Vol. iv, p. 237.
[2]Journ. N. Y. Ent. Soc., Vol. xiii, p. 50.

Actual date of publication, June 30, 1924.

EDITORIAL.

It is easy to criticize. It is still easier to find fault; and of the making of rules there is no end. Realizing all this, one is still tempted to admonish his brethren in the ways of righteousness, if only to the extent of pointing out some practices that are more commendable than others. In systematic entomology we may do this with considerable pertinence; because criticism is practically our only means of self defense. Any one is free to make new species—which is as it should be; and he can make them in any way he sees fit so long as he conforms to certain very easy legal formalities—which is not so good. All too many ill-formed brain children are sent into the world to become charges on public charity, a procedure more to be censored than excused. As some one said of husband killing: "it is getting too common; there should be a law against it." In absence of the law, we humbly submit a suggestion.

Let us have fewer words and more figures. A good figure of the adult—particularly if it be in color—is better than any word picture. A drawing of structural details—even though it be crude and aesthetically unsatisfying— is more enlightening than a torrent of the most carefully selected adjectives. Even a photograph has its uses; though, unfortunately, it does not compel the author to display either his knowledge or his ignorance. It is in many respects the poorest form of illustration; but is much better than no illustration at all. A noted lepidopterist and one of the most conscientious systematists of modern times (M. Charles Oberthür) goes so far as to deny the validity of merely verbal description and refuses to recognize a species until it is figured. This is going too far. Neither law nor custom sanction such a rule. One can only wish they did, that they had always done so. In the Lepidoptera we have hundreds of obscure species separated upon purely superficial and comparative characters, slight differences in color and pattern that can be seen much better than they can be described, and described much better than they can be envisioned from a description. Nearly all such species, however, show striking and characteristic structural modifications in genitalia, characters that one would find it difficult if not impossible to describe in any really satisfactory way; but which can easily be figured. Good figures, however, take longer to make than descriptions and cost more to reproduce. If we insisted upon having them it would mean a slowing up on species making all along the line. Perhaps this would not be altogether an unmixed evil.

—*Carl Heinrich.*

NOTES AND NEWS ITEMS.

Autobiographies of Entomologists and Arachnologists Wanted.—For years I have been collecting materials for a Biographic Entomological Dictionary, to contain biographies of entomologists and arachnologists of all times and of all countries. Biographies of deceased entomologists and arachnologists I have already obtained from the literature almost completely, but to get biographies of living colleagues is much more difficult. Accordingly, autobiographies are wanted, and I hereby beg for such to be sent to me. All entomologists and arachnologists who have done scientific work as authors or as collectors are to be dealt with in this work. The autobiographies will, as far as possible, be printed in the form and the language as sent to me. Those who do not send their autobiographies ought not to expect that their biographies shall be contained in the book. Should anybody be willing to collect contributions for the work, I would beg him to be so kind as to communicate with me. The printing of the work is not in question.

—*Embrik Strand*,
Professor of Zoology and Director of the Systematic Zoological Institute of the University of Riga (Latvia), Kronvalda bulvars 9.

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DISTRICT OF COLUMBIA DIPTERA: TROMOPTERA (CYRTIDAE, BOMBYLIIDAE, THEREVIDAE, SCENOPINIDAE).

By F. R. Cole, J. R. Malloch, and W. L. McAtee.

Family CYRTIDAE.

This small family contains some of the most interesting flies known to science, both their structures and their habits being very unusual in the suborder to which they belong. They are unique in the Brachycera in having some of the abdominal spiracles situated in the tergites and also in having larvae which live internally in spiders. The eastern species are for the most part rare in collections and it is very seldom that the insects are met with commonly in the field, though there are records of some cases in which they have been found flying in numbers around dead twigs of trees. All the eastern forms are rather small, with small heads, aborted mouth parts, and inflated balloon-like bodies. The western genus Eulonchus, and the species of Lasia found in Mexico and South America have the proboscis elongated and are known to feed on the nectar of flowers. These species are quick, strong fliers, but the eastern forms are not very active and have a floating, aimless sort of flight.

Key to the genera.

1. With three distinct ocelli 2
   With but two distinct ocelli 3
2. Costa of wing thickened near apex of first vein, usually with a spur at this point in the male; antennae inserted below middle of head in profile, third segment with three long apical hairs ..... *Pterodontia.*
   Costa of wing not thickened and without a spur at apex of first vein; antennae inserted on top of head, third segment with a slender apical arista ..... *Acrocera.*
3. Venation of wings complete, attaining margin, discal cell present; antennae situated on top of head, near vertex ..... *Opsebius.*
   Venation of wings incomplete, most of the veins not attaining margin of wing; discal cell absent; antennae inserted low down on head, near margin of mouth ..... *Ogcodes.*

Genus **PTERODONTIA** Gray.

P. analis Westwood.—Beltsville, Md., July 9, 1916, McAtee.

Genus **ACROCERA** Meigen.

Key to the species.

1. Second longitudinal vein represented by a very distinct apical rudiment; wings fumose ..... *bimaculata.*
   Second longitudinal vein obliterated; wings hyaline ..... *unguiculata.*

A. bimaculata Loew.—Virginia shore above Key Bridge, Aug. 3, 1914, McAtee; Plummers Id., Md., May 31, 1915, R. C. Shannon; May 8, 1915, Jacksons Id., Md., Aug. 31, 1902, H. S. Barber.

A. unguiculata Westwood.—Fort Washington, Md., May 26, 1885, C. W. Johnson.

Genus **OGCODES** Latreille.

Key to the species.

1. Length 7–9 mm.; wings strongly infuscated ..... *incultus.*
   Smaller species; wings usually hyaline ..... 2.
2. Male orange to brownish yellow, with dark brown spots on the abdominal spiracles; female brown, with indistinct lighter margins on the abdominal segments ..... *dispar.*
   Species with a different coloration ..... 3.
3. Humeri yellowish; scutellum more or less yellow; posterior margins of abdominal segments with broad, sharply defined white margins ..... *costatus.*
   Humeri blackish; scutellum blackish ..... 4.
4. Legs dull yellowish, coxae black ..... *borealis.*
   Legs black or blackish brown; wings hyaline; rims of halteres blackish ..... *pallidipennis.*

O. borealis Cole.—Plummers Id., Md., Aug. 23, 1919, H. S. Barber.

O. costatus Loew.—Vienna, Va., June 4, 1913, R. A. Cushman; same locality and date, in copula, C. W. Hooker; Falls Church, Va., June 1, 1916, Wm. Middleton, Aug. 26, 1915, C. T. Greene, Aug. 27, N. Banks; Maywood, Va., June 4, 1922, McAtee; Glen Echo, Md., May 26, 1923, Malloch; Branchville to Beltsville, Md., June 4, 1914, L. O. Jackson.

O. dispar Macquart.—Plummers Id., Md., May 30, 1911, H. S. Barber, June 4, 1905, E. A. Schwarz; June 13, 1905, D. H. Clemons; Aug. 9, 1902, E. A. Schwarz and H. S. Barber; Aug. 9, 1914, McAtee; Aug. 28, 1912, in copula, E. A. Schwarz; Beltsville, Md., June 15, 1919, L. L. Buchanan.

O. incultus Osten Sacken.—Falls Church, Va., N. Banks.

O. pallidipennis Loew.—Falls Church, June 23, N. Banks; Maywood, Va., June 20, 1921, McAtee; Dixie Landing, Va., May 25; Washington, D. C., June 1, C. H. T. Townsend; June 11, P. R. Myers; College Park, Md., Aug. 17, 1912, W. D. Appel.

Genus **OPSEBIUS** Costa.

O. sulphuripes Loew.—Falls Church, Va., August 11, N. Banks.

Family BOMBYLIIDAE.

This family, various species of which are popularly known as beeflies or flower flies, is not so numerously represented in this as in some other regions. Many of the species frequent sandy areas and as a whole the family is better represented in the western plains states than in the east. The larvae so far as known are predacious or parasitic, some such as *Exoprosopa fascipennis* attacking hymenopterous primary parasites of other insects, others are inquilines or parasites in the nests of bees and wasps, or in the burrows of coleoptera, or are parasitic on grasshopper eggs, or lepidopterous larvae. The adults frequent flowers and fly in bright sunshine. They poise in the air and when disturbed dart away with a rapidity which baffles the eye.

Key to the genera.

1. Distance between anterior cross-vein and furcation of second and third veins, not greater than length of anterior cross-vein; second vein bent at base, leaving third at, or almost at, a right angle, or the discal cell confluent with second basal cell ..... 2.
   Distance between anterior cross-vein and furcation of second and third veins much greater than length of anterior cross-vein, second vein usually forming an actue angle with third at its base; discal cell always separated from second basal cell ..... 5.
2. Second vein very short, connecting with first at middle of wing to form a small subtriangular cell; no cross-vein between discal and second basal cells ..... *Pachyneres*.
   Second vein long, entering costa near apex of wing; a cross-vein between discal and second basal cells 3
3. Apex of antennal style with a pencil of stiff hairs; pulvilli distinct, normal; vertex more or less abruptly declivous immediately behind ocelli, posterior ocelli in line with hind angles of eyes; basal costal process broad, subtriangular or leaf-like ..... *Spogostylum*.
   Apex of antennal style without a pencil of stiff hairs; pulvilli vestigial or absent; vertex not abruptly declivous immediately behind ocelli; basal costal process of wing lanceolate or spike-like 4
4. Pulvilli of mid and hind tarsi replaced by a tooth-like process which simulates a basal tooth to each claw ..... *Exoprosopa*.
   Pulvilli absent, claws at most slightly angulate basally ..... *Anthrax*.
5. Wing with 4 posterior cells ..... 6.
   Wing with 3 posterior cells ..... 12.
6. First posterior cell closed ..... 7.
   First posterior cell open ..... 8.
7. First basal cell of wing not longer than second ..... *Systoechus*.
   First basal cell of wing longer than second ..... *Bombylius*.
8. Proboscis short, hardly extending beyond anterior margin of mouth opening ..... *Anisotamia*.
   Proboscis long and slender, extending very much beyond anterior margin of mouth opening ..... 9.

9. Anal cell closed; body sparsely hairy ..... *Phthiria.*
   Anal cell open; body densely haired or scaly ..... 10.
10. Vestiture of antennae, thorax, and abdomen consisting entirely of hairs, or body almost entirely bare; wings bare ..... 11.
    Vestiture of antennae, thorax and abdomen consisting largely of flat scales; wings partly scaly ..... *Lepidophora.*
11. Body robust, densely hairy ..... *Sparnopolius.*
    Body slender, practically bare ..... *Metacosmus.*
12. Abdomen remarkably elongate and slender, its length distinctly exceeding that of wing, segments of basal portion 4 or 5 times as long as broad when seen from above, the insect resembling a species of Sphex (Hymenoptera, Aculeata); eyes in both sexes touching above; body sparsely short haired ..... *Systropus.*
    Abdomen not elongate, subcylindrical or conical, not noticeably longer than wings, the tergites basally not longer than broad when seen from above; eyes of females widely separated above ..... 13.
13. Body and legs largely or partly clothed with scales ..... *Toxophora.*
    Body and legs without scales ..... 14.
14. Antennae long and slender, tapered to a point ..... *Geron.*
    Antennae robust, not tapered to a point, with a short style before apex above ..... *Rhabdoselaphus.*

Genus **SPOGOSTYLUM** Macquart.

Key to the species.

1. Anal angle of wing undeveloped, the cell between anal vein and margin of wing narrower than the one in front of that vein, and narrower basally than apically; wing broadly blackened along fore margin from base to apex, the dark color covering entire base, its posterior outline notched or undulated beyond base; basal costal process, squamae, and most of the hairs in the fringes behind the latter, fuscous ..... *argyropyga.*
   Anal angle of wing developed, the cell between anal vein and margin of wing broader than the one in front of that vein, widest at or near middle, or at base ..... 2.
2. A cross-vein connecting the vein forming hind margin of discal cell beyond its middle with the vein behind it, forming a small closed cell; all veins of wings bordered with dark brown, which color is in places confluent, forming several large irregular blotches ..... *simson.*
   No cross-vein connecting the above veins; rarely there is a spur of a vein projecting from hind side of discal cell, but it never connects with the vein behind it to form a closed cell; wings otherwise marked ..... 3.
3. Squamae and basal costal process of wing entirely fuscous ..... 4.
   Squamae apically whitish, basal costal process yellowish apically ..... 5.
4. Wings entirely blackened; fringes of squamae fuscous ..... *slossonae.*
   Wings blackened on basal half, the angulated outline of the dark area extending diagonally across wing from apex of anal cell to a point about one-third from apex of costal margin; fringes of squamae largely pale .... *anale.*

5. Entire field of wing peppered with black dots which form patches on parts of disc, especially on basal half and near costa; fringe behind squamae largely or entirely black.....*oedipus*.
   Wing with a few dark spots, confined largely to the cross-veins and forks of the longitudinal veins, and more or less broadly, conspicuously suffused with fuscous basally.....6.
6. Black color of basal portion of wing not sharply limited apically, the tips of wings smoky, not pure hyaline; cross-vein at apex of discal cell usually distinctly infuscated; costal vein distinctly thickened at base; male hypopygium with the apical dorsal pair of processes broad, barely rounded at apices, the bristles fine and hair-like, the shoulders at bases of these processes on inner side forming a right angle, the outer margin of hypopygium with a broad rectangular shoulder about one third from apex.....*obsoletum*.
   Black color of basal portion of wing less extensive, sharply limited apically, the tips of wings pure hyaline; cross-vein at apex of discal cell usually unclouded; costal vein not thickened at base; male hypopygium with the apical dorsal pair of processes narrowed apically, the tips narrowly rounded, and with short stiff bristles, the shoulders at bases of these processes not forming a right angle, more forwardly projecting, simulating a short-round process, the outer margin of hypopygium more rounded off on the swollen part at base of the apical process.....7.
7. Fork of third vein with a conspicuous fuscous spot.....*limotulus*.
   Fork of third vein not spotted.....*limatulus* var. *pauper*.

S. anale Say.—Great Falls, Va., Sept. 5, 1916, McAtee; Falls Church, Va., July 15, 1917, I. N. Gabrielson; Aug. 4, 1913, Sept. 13, 1912, C. T. Greene; Kalmia Road, D. C., Sept. 9, 1916, McAtee; Riverdale, Md., June 2, Beltsville, Md., July 16, Cole; Odenton, Md., July 29, 1917, McAtee.

S. argyropyga Wiedmann.—The most common species of the genus; found throughout the region; season June 9 to Sept. 1; has been taken on flowers of *Viburnum nudum*. P. I.

S. limatulus Say (*albofasciatum* Macquart; *pauper* Loew).—Cabin John, Md., June 24, Cole; Bladensburg, Md., June 4, 1916, on flowers of *Tephrosia virginica*, L. O. Jackson; Beltsville, June 16, 1918, July 1, 1917, July 4, 1912, McAtee; July 6, 16, Sept. 10, Cole; Odenton, Md., June 11, 1922, McAtee. *S. limatulus* var. *pauper* Loew (var. a. Say).—Beltsville, Md., June 9, N. Banks; July 4, 1912, 1916, McAtee; Aug. 22, 1917, C. T. Greene; Brookland, D. C., June 18, 1914, in copula, J. B. Parker; Bladensburg, Md., June 23, 1916; Camp Meade, Md., June, 1918, Shannon.

S. obsoletum Loew.—Falls Church, Va., June 16, 1915, on flowers of Ceanothus, C. T. Greene; Sept. 10, N. Banks; Mt. Vernon, Va., July 4, 1917; Plummers Id., Md., June 14, 1908, July 7, 1912; Beltsville, Md., July 9, 1916, McAtee.

S. oedipus Fabricius.—Common and widespread; extreme dates of collection, May 19 and Oct. 10. P. I.

S. simson Fabricius.—Common and widely distributed; season July 12 to August 28; in copula July 14; bred specimens have emerged July 27 and Aug. 8.

S. slossonae Johnson (*cephus* auctt. nec Fabricius).—Falls Church, Va., June 18, N. Banks; June 23, 1915, C. T. Greene; June 24, 1915, S. A. Rohwer; Glencarlyn, Va., July 8, 1915, C. T. Greene; Plummers Id., Md., Aug. 4, 1907, July 19, 1924, Shannon; Maryland near Plummers Id., July 27, 1916, McAtee; Hyattsville, Md., Aug. 3, 1916; Beltsville, Md., July 2, 1916, W. R. Walton; June 25, 1915, R. C. Shannon.

Genus **EXOPROSOPA** Macquart.

Key to the species.

Wings blackish brown, a small spot near middle of disc, and the apices broadly hyaline, the hyaline part usually extending narrowly along posterior margin and sometimes more or less connected with the central hyaline spot ..... *emarginata* Macquart.

Wings blackish brown, with two broad irregular hyaline fasciae, one near base and the other beyond middle, neither of which reaches the costal margin, and the apical hyaline part usually connected with the outer hyaline fascia at the hind margin ..... *fascipennis* Say.

E. emarginata Macquart.—Common; season June 12 to July 29; in copula July 13; has been collected on flowers of *Ceanothus americanus*, *Sericocarpus linifolius*, and *S. bifoliatus*. V. P. I.

E. fascipennis Say.—Fairly common; extreme dates of collection June 12 and September 28; has been collected on flowers of *Sericocarpus bifoliatus*.

Genus **ANTHRAX** Scopoli.

Key to the species.

1. Wings without conspicuous markings; upper mouth margin not produced conically ..... 2.
   Wings with conspicuous brown or fuscous markings ..... 3.
2. More slender, smaller species; fourth and fifth abdominal segments with some conspicuous scale-like hairs on sides; fore tibiae without posterodorsal setulae ..... *lateralis*.
   More robust, larger species; abdominal segments without conspicuous scale-like hairs on sides; fore tibia with a series of distinct posterodorsal bristles ..... *alternata*.
3. Basal half or more of wings almost or entirely solid brown or fuscous, apical part entirely hyaline ..... 4.
   Wings mottled or streaked, not sharply bipartite in color ..... 5.
4. Outer edge of dark portion of wing forming an almost straight line, not conspicuously erose nor produced along costa; hairs of abdomen largely fulvous; face conspicuously subconically produced above mouth ..... *fulvohirta*.

Outer edge of dark portion of wing conspicuously erose and produced to near tip of costa; hairs and scales of abdomen largely black; face very little produced above mouth ..... *sinuosa.*

5. Wing markings consisting of fused or subcontiguous fuscous spots which form three more or less well defined groups, one at base, a fascia just before middle, and another beyond middle, with one or two small spots at apex of costa; a cross-vein connecting fork of third vein near its base with the vein in front of it ..... *banksi.*

Wing largely yellowish brown, darker along the veins and with one or more small subhyaline marks near middle and at apex; no cross-vein connecting fork of third vein with the vein in front of it ..... *ceyx.*

A. alternata Say.—Falls Church, Va., July 1, S. A. Rohwer; Great Falls, Va., June 29, 1915, C. T. Greene; Plummers Id., Md., July 10, 1910, July 21, 1912, McAtee; Hyattsville, Md., Sept. 24, 1916; Riggs Mill, Md., Sept. 18, 1916; Beltsville, Md., July 23, 30, 1916, W. R. Walton; June 28, 1911, F. Knab.

A. banksi Johnson (*serpentina* Auctt. nec Osten Sacken [*Dipalta* O. S.]).—Great Falls, Va., Aug. 6, 1913, C. T. Greene; July 8, Sept. 12, N. Banks; Aug. 1, 1916; Scott's Run, Va., July 4, 1918; Falls Church, Va., Sept. 7, N. Banks; Beltsville, Md., July 4, 1916, McAtee; Linneville, Md., July 4, 1913, R. C. Shannon.

A. ceyx Loew (*halcyon* Auctt. nec Say; *nigripennis* Cole).—Dead Run, Va., June 10, 1922, McAtee, Falls Church, Va., June 24; Glencarlyn, Va., July 2; N. Banks; Beltsville, Md., July 2, 4, 1916, W. R. Walton; July 9, Sept. 7, 1916, Cole; July 6, 1916, C. T. Greene; July 4, 1915, Odenton, Md., July 4, 1913, McAtee.

A. fulvohirta Wiedemann.—Common in the Coastal Plain; season June 30 to Sept. 28; has been collected on flowers of *Sericocarpus bifoliatus.*

A. lateralis Say.—Abundant and widespread, extreme dates of collection June 10 and October 2; has been taken on flowers of *Ceanothus americanus* and *Daucus carota.* P. I.

A. sinuosa Wiedemann.—Common and widely distributed; season June 4 to Sept. 3; visits flowers of *Ceanothus americanus.* P. I.

Genus **BOMBYLIUS** Linnaeus.

Key to the species.

1. First posterior cell of wing open, or closed only at extreme apex ..... *ater.*

First posterior cell of wing closed at a considerable distance from margin of wing ..... 2.

2. Cross-vein distinctly beyond middle of discal cell; wings with isolated dark spots ..... 3.

Cross-vein not beyond middle of discal cell ..... 4.

3. Wing markings fasciate, the spots almost all connected; cross-vein at much less than its own length from apex of discal cell; apical curvature of second vein almost a right angle ..... *pulchellus.*

Wing markings consisting of a fuscous suffusion on front half of wing from base to middle which tapers off beyond that point, and several isolated spots in the hyaline posterior half of wing; cross-vein at about its own length from apex of discal cell; apical curvature of second vein rounded. .. *pygmaeus.*

4. Mid femur with a few bristles on anteroventral surface; wings grayish, slightly darker basally and along costa; pile of body mostly hoary. . *incanus.*
   Mid femur without anteroventral bristles, with fine hairs basally. . . . 5.
5. Wing almost uniformly infuscated, paler (lutescent) rather than darker basally ..... *fraudulentus.*
   Wings with contrasting hyaline and fumose areas, darker basally . ..... 6.
6. Wing with the dark markings consisting of a dark brown costal blotch extending from base to apex of second vein, the posterior margin of which is irregularly sinuated and abruptly differentiated from the hyaline hind part of wing; pile of body mostly tawny..... ..... *major.*
   Wing with the dark markings consisting of a basal suffusion of fuscous or brownish which extends along costa but not to apex of second vein and more or less gradually shades off into the hyaline posterior portion of wing.....7.
7. Mid and usually also fore femora each with one or two short black bristles at apex behind; wings rather conspicuously browned basally, the dark color extending along costa to slightly beyond middle ....*varius.*
   Mid and fore femora without a bristle at apex behind.. ....8.
8. Proboscis about as long as body of insect including head; hairs along upper margin of pleura in front of wings much darker than those on margin of mesonotum.. .....9.
   Proboscis shorter than entire body; hairs along upper margin of pleura in front of wings not darker than those on margin of mesonotum; body pile mostly yellowish, no pale patches; wing with a brownish cloud covering entire base and extending to middle along costa..... *fulvibasis.*
9. Pile of dorsum yellow; wings marked as in *fulvibasis*..... *validus.*[1]
   Pile of dorsum chiefly dark, with white patches on thorax and abdomen; wing clouding similar to that of preceding two species, but blackish..... *azaleae.*

B. ater Coquillett (*Parabombylius* Coq.).—Beltsville, Md., July 4, 1912, McAtee.

B. azaleae Shannon.—A common visitant to the flowers of Azalea including both *A. nudiflora* and *A. viscosa* in Coastal Plain localities; the extreme dates of collection are May 5 and July 4.

B. fraudulentus Johnson.—Bladensburg, Md., June 23, 1916, R. C. Shannon; Branchville to Beltsville, Md., June 4, 1914, L. O. Jackson; Beltsville, Md., June 25, R. C. Shannon; July 2, 4, 1916, W. R. Walton, McAtee; July 9, Cole; Odenton, Md.,

[1]An old specimen of *B. validus* Loew labelled Va. only, may be from our region; at any rate the species is to be expected here.

June 20, 1915, in copula, McAtee; Falls Church, Va., June 6, 1915, June 25, 1917, C. T. Greene.

B. fulvibasis Macquart.—Common, chiefly on the Coastal Plain; has been collected at dates ranging from May 19 to July 4; visits flowers of *Ceanothus* and *Xolisma*.

B. incanus Johnson.—Has been taken only at Bladensburg, Beltsville, and Odenton, rather plentifully, however, at the intermediate locality; season June 9 to July 20; frequents flowers of *Xolisma* and is fond of resting on sandy roads.

B. major Linnaeus.—The most common and widely distributed species of the genus; it is also the earliest species of the family to appear in spring; extreme dates of collection are: March 13 and June 10; visits flowers of apparently every kind in bloom during its season. P. I.

B. pulchellus Loew.—Mt. Vernon, Va., April 28, 1918; Maywood, Va., April 27, 1919; Bladensburg, Md., April 19, 1914, on flowers of *Houstonia caerulea;* Beltsville, Md., May 31, 1920, McAtee; Brookland, D. C., May 3, 1916, Parker.

B. pygmaeus Fabricius.—Falls Church, Va., May 1, N. Banks; Glencarlyn, Va., May 7, 1922; Maywood, Va., April 27, 1919, on flowers of *Vaccinium*, McAtee; Dyke, Va., April 26, 1913, W. D. Appel; Brookland, D. C., May 3, 1916; Parker; Odenton, Md., May 5, 1918, on flowers of *Potentilla quinquefolia* and *Vaccinium corymbosum*, McAtee.

B. varius Fabricius (United States specimens sometimes misidentified as *B. mexicanus* Wied.).—Common, mostly in Coastal Plain localities; season May 25 to July 9; in copula, July 4; visits flowers of *Ceanothus*, *Xolisma*, and *Azalea*. V. P. I.

Genus **SYSTOECHUS** Loew.

S. vulgaris Loew.—Beltsville, Md., Sept. 3, 1916, McAtee.

Genus **ANISOTAMIA** Macquart.
Ogcodocera Macquart.

A. leucoprocta Wiedemann.—Falls Church, Va., June 16, 1915, on flowers of *Ceanothus*, C. T. Greene; Barcroft, Va., June 17, 1917, on flowers of *Ceanothus;* Beltsville, Md., June 15, 1913, McAtee; Bladensburg, Md., June 23, 1916, R. C. Shannon.

Genus **PHTHIRIA** Meigen.

Key to the species.

1. A faint cross-vein present near apex of auxiliary vein connecting it with first vein; a line drawn obliquely from apex of second vein to upper outer angle of discal cell would bisect cell enclosed within fork of third vein near its base; cross-veins in disc of wing narrowly clouded; third antennal segment not three times as long as its greatest width.....*sulphurea.*

No cross-vein between auxiliary and first veins; a line drawn obliquely from apex of second vein to upper outer angle of discal cell would pass clear of base of cell formed by fork of third vein; no clouds on cross-veins; third antennal segment over three times as long as its greatest width..... *coquilletti*.

P. coquilletti Johnson.—Maryland near Plummers Id., July 12, 1913, R. C. Shannon.

P. sulphurea Loew.—Odenton, Md., June 11, 1922, McAtee.

Genus **LEPIDOPHORA** Westwood.

L. aegeriiformis Westwood.—Beltsville, Md., Sept. 3, 10, 1916, McAtee; these were sitting on a telephone pole near a marshy creek bed.

Genus **SPARNOPOLIUS** Loew.

S. fulvus Wiedemann.—A common autumn bee-fly frequenting the flowers of *Chrysopsis mariana;* dates of collection range from Aug. 20 to Oct. 30; in copula, Sept. 21, 23. P. I.

Genus **SYSTROPUS** Wiedemann.

S. macer Loew.—An autumnal species, season Aug. 28 to Oct. 30; usually found in numbers together about flowers.

Genus **METACOSMUS** Coquillett.

M. mancipennis Coquillett.—Difficult Run, Va., July 7, 1915, R. C. Shannon; Chain Bridge, Va., June 23, 1913, C. T. Greene; Beltsville, Md., July 4, 1916, W. R. Walton. On the latter date these little Pipunculus-like flies were common and all apparently pairing.

Genus **GERON** Meigen.

Key to the species.

1. Section of third vein beyond base of fork much shorter than the section in front of it, the cell within the fork wide, distance between apices of veins forming fork measured along margin of wing exceeding the length of the section between fork and second vein; femora black; frons of female wide, black, whitish on sides and in front, with yellow pile in center and whitish hairs on sides..... *subauratus*.

Section of third vein beyond base of fork not shorter than the section in front of it, the cell within the fork long and narrow, distance between apices of veins forming fork not exceeding that between fork and second vein; femora largely yellowish; frons of female narrow, white plumose, with a few short decumbent whitish hairs..... *calvus*.

G. calvus Loew.—Difficult Run, Va., July 7, 1915, on *Ceanothus*, Dead Run, Va., June 22, 1915, R. C. Shannon; New Alexandria, Va., July, 1907, Wm. Palmer; Falls Church, Va., July, 1915, Cole; Glen Echo, Md., July 9, 1922, Malloch; Riverdale, Md., June 5, 1915; Beltsville, Md., July 9, 1916, Cole; July 4, 9, 1916, McAtee; June 25, 1915; Bladensburg, Md., June 23, 1916, R. C. Shannon.

G. subauratus Loew.—This is the more common and generally distributed species; season June 18 to Sept. 23; visits numerous kinds of flowers. V. P. I. The genitalia are of the type described for *G. digitaria* Cresson (1919, pp. 184-5). Cresson records from Linnieville, Md., July (R. C. Shannon), a variety of his *G. nivea* (l. c. p. 185).

Genus **TOXOPHORA** Meigen.

T. amphitea Walker.—Common; has been collected at dates ranging from May 23 to Sept. 23; visits many kinds of flowers. A pupal skin and adult were found in a bee's nest at Licking Banks, D. C., Nov. 27, 1914, H. S. Barber. P. I.

Genus **RHABDOSELAPHUS** Bigot.

R. sigma Coquillett.—A series of specimens was taken by Cole in East Riverdale, Md., March 25, 1917. These are only 2.25 to 3 mm. in length as compared to western specimens 3.75 to 4 mm. in length. The proboscis is shorter than in the western material examined, but otherwise the specimens are structurally the same. These little flies are among the first to brave the spring weather and were locally quite abundant in 1917. Other local records are Berwyn, Md., April 1, 1917, and Beltsville, Md., April 2, 1917, McAtee. In all these cases the insects were collected from telephone poles. At Widewater, Va., April 2, 1916, McAtee took the species on flowers of *Salix tristis*.

Genus **PACHYNERES** Greene.

P. crassicornis Greene.—Originally described from specimens reared from a decaying tree of *Quercus velutina* in the grounds of the Soldiers Home, Washington, D. C. (April 15–20, 1923, Miss E. E. Myers), and others obtained in Manitoba and Pennsylvania. A species of this genus occurs in New South Wales, Australia also, but no others are as yet known.

Family THEREVIDAE.

The members of this family resemble some of the Asilidae in general habitus, and especially some Dasypogoninae, but the vertex of the head is never sunken as in the members of that family nor do the eyes bulge out so much on the sides. The flies occur most commonly in sandy areas and are fond of settling on the bare sand in the sunshine, though they occur also on flowers. They are recorded as being predacious, but the record requires confirmation. The larvae that are known feed on coleopterous larvae, some of them doing considerable good by destroying the larvae of Elateridae, and Malloch has found a species feeding upon coleopterous larvae in a hollow, much-decayed apple tree. Therevidae are rare in the east but some occur quite commonly in the Western States.

Key to the genera.

1. Sides of face with long erect pile between lower margin of eye and base of antenna ..... *Thereva.*
   Sides of face bare between lower margin of eye and base of antenna ..... 2.
2. Prosternum hairy between bases of fore coxae; wings not fasciate ..... *Psilocephala.*
   Prosternum bare between bases of fore coxae; wings usually fasciate with fuscous ..... *Epomyia.*

Genus **PSILOCEPHALA** Zetterstedt.

Key to the species.

1. Halteres brownish yellow; hairs on dorsum of thorax golden yellow, the disc without a dark median vitta; hairs on the male hypopygium all yellow ..... *flavipennis.*
   Halteres fuscous or black; hairs on dorsum of thorax in male mostly white, in female yellowish mixed with black, both sexes with a distinct black opaque dorsocentral vitta; male hypopygium with some black hairs ..... 2.
2. Hairs on sternite forming basal ventral portion of male hypopygium whitish, only a tuft on each inner apical angle black; silvery pruinescence on each side of frons in female carried in the form of a narrow lateral stripe above bases of antennae, not forming a triangle ..... *frontalis.*
   Hairs on most of disc of sternite forming basal ventral portion of hypopygium black, no tuft of black hairs on each apical angle; silvery pruinescence forming a triangle on each side of frons above bases of antennae ..... *haemorrhoidalis.*

P. flavipennis Cole.—Cupid's Bower, Id., Md., July 8; Plummers Id., Md., July 14, Aug. 3, at light, R. C. Shannon; Falls Church, Va., July 13, 1912, C. T. Greene; July 13, 1913, F. Knab; July 17, 25, N. Banks.

P. frontalis Cole.—Falls Church, Va., Aug. 15, 1913, C. T. Greene.

P. haemorrhoidalis Macquart.—The most common species of the family; it is of general distribution and has been collected from June 14 to Sept. 2; comes to light, and is attracted to honey dew. An active larva collected in sand on Plummers Id., Md., May 5, 1914, by R. C. Shannon, had transformed and emerged as an adult by May 5.

Genus **EPOMYIA** Cole.

Key to the species.

1. Scutellum red, narrowly black at base ..... *scutellaris.*
   Scutellum black ..... 2.
2. Scutellar pile yellowish or whitish along hind margin; abdomen usually entirely or largely reddish ..... *rufiventris.*
   Scutellar pile black; abdomen black, male hypopygium yellowish ..... *pictipennis.*

E. pictipennis Wiedemann.—Maryland near Plummers Id., June 29, 1913, June 20, 1916; Bladensburg, Md., June 23; R. C. Shannon; Beltsville, Md., June 15, 1913, McAtee.

E. rufiventris Loew.—Maryland near Plummers Id., June 29, 1913, R. C. Shannon; Beltsville, Md., May 28, 1916, June 14, 1914, McAtee; June 9, N. Banks; June 28, 1917, L. O. Jackson; July 1, 1911, J. D. Hood.

E. scutellaris Loew.—Plummers Id., Md., June 15, 1903, A. Busck; Lakeland, Md., June 25, 1906, D. H. Clemons.

Genus **THEREVA** Latreille.

Key to the species.

1. Frons with two distinct round velvety black spots ..... *bimaculata.*
   Frons with a dark crossband ..... *candidata.*

T. bimaculata Cole.—Falls Church, Va., May 18, 1917, C. T. Greene.

T. candidata Loew.—Eleven records, all from Piedmont localities; dates range from May 30 to Aug. 6. P. I.

Family SCENOPINIDAE.

Of the genera of this family some have clung to the original habitat where their larvae have been found in decaying fungi and wood, but members of one genus, *Scenopinus*, have become almost solely house inhabitants. Their larvae are reported to be carnivorous and to prey upon clothes-moths among other things; the slug-like and slow-moving adults are seen more frequently on windows than elsewhere, and are called window flies.

Key to the genera.

1. First posterior cell open ..... *Scenopinus.*
   First posterior cell closed before margin of wing ..... *Metatrichia.*

Genus **METATRICHIA** Coquillett

M. bulbosa Osten Sacken.—Washington, D. C., June 19, 1914, P. R. Myers; Vietch to Torrison, Va.; July 18, 1915; Mt. Vernon, Va., July 4, 1917, on flowers of *Sericocarpus linifolius*, McAtee.

Genus **SCENOPINUS** Latreille.

Key to the species.

1. Frons polished, bluish black ..... *fenestralis.*
   Frons more or less granular, greenish-black ..... *glabrifrons.*

S. fenestralis Linnaeus.—Fairly common; dates of collection range from May 7 to Aug. 15; comes to light. P. I.

S. glabrifrons Meigen.—All records (8 in number) are for the city of Washington, and at dates between May 20 and Sept. 23, inclusive.

SUMMARY.

A comparison of the District of Columbia representation of

the four families here treated with that reported for New Jersey (Ann. Rep. N. J. State Museum (1909) 1910, pp. 744-748) is given in the following tabulation. For convenience of local students the number of species collected on Plummers Id. (P. I.) and additional ones in the vicinity (V. P. I.) also are included.

	Number of Species.			
Family	*N. J.*	*D. C.*	*P. I.*	*V. P. I.*
CYRTIDAE	5	9	3	1
BOMBYLIIDAE	40[1]	37	12	10
THEREVIDAE	9	8	4	2
SCENOPINIDAE	2	3	1	....
Totals	56	57	20	13

The slight superiority of New Jersey as a collecting place for Bombyliidae no doubt is correlated with the greater proportion of sandy country in that State. Bee-flies love sand. Locally this statement is strongly exemplified by the preeminence of the sandy Beltsville region as a habitat for these flies; of the 37 species of Bombyliids known from the District of Columbia region, 33 have been collected near Beltsville.

Species of the various families not yet collected here, that may reasonably be expected are: Cyrtidae, *Opsebius gagatinus* Loew; Bombyliidae, *Exoprosopa fasciata* Macquart, *Anthrax tegminipennis* Say, *Bombylius atriceps* Loew, *B. validus* Loew, *Anastoechus barbatus* Osten Sacken; Therevidae, *Tabuda fulvipes* Walker, *Psilocephala morata* Coquillett; and Scenopinidae, *Scenopinus nubilipes* Say.

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Acrocera unguiculata Westwood (p. 54), *Ogcodes incultus* Osten Sacken (p. 63), and *O. dispar* Macquart (p. 66) recorded from the District of Columbia region.

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[1]Synonyms as given in this paper deducted.

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CHANGE OF PREOCCUPIED NAMES.

BY J. M. ALDRICH AND RAY T. WEBBER.

In the paper on Phorocera and Allied Genera by us in Proceedings U. S. N. M., vol. 63, Article 17, issued Feb. 29, 1924, two preoccupied names were used. For *Phorocera tenuiseta* A. & W. (not of Macquart, 1846) we now propose the name *Phorocera victoria;* and for *Phorocera xanthura* A. & W. (not of Van der Wulp, 1890) we propose *Phorocera nitelae.*

A NEW MOTH OF THE SUBFAMILY PHYCITINAE.

By W. Schaus.

Epischnia parkerella, new species.

Male.—Palpi white laterally mottled with gray and black. Head and throat white; neck behind, collar and thorax olive buff. Abdomen above pearl gray, the three basal segments with olive buff band, the following segments with narrower white segmental bands; anal segment olive buff, laterally and underneath white. Legs mostly white finely irrorated with drab gray, the fore tibiae fuscous black, the tarsi white. Fore wing olive buff, the costa and inner margin white, the former with a few minute dark irrorations; the subcostal vein on basal half more thickly irrorated with black, forming a small antemedial streak, and a similar short streak on vein 1, slightly outset, the two connected by a very faint dusky oblique shade; a few black scales at upper and lower angle of cell; a pale olive buff shade from costa near apex, inbent to vein 2 then outbent, defined proximally by a deep olive buff narrow shade and some black scales on costa, distally a few black scales on costa and the terminal olive buff ground color; termen narrowly and diffusely pearl gray with small clusters of black scales on interspaces; cilia pearl gray at base with some black scales, then whitish with a dark line at tips. Hind wing suffused with mouse gray; a fine dark line at termen; cilia white with a dark line close to base. Fore wing below with smoky suffusions on disc and a white line on discocellular. Hind wing below whitish with faint dark suffusions except on termen.

The two female specimens received are rather different; one is like the male but has a white antemedial outcurved line connected with the outer line by more extended white medially above vein 1; the outer line is white and distinct, outbent at vein 2 as in the male.

The other female has the wing from below costa thickly irrorated with deep neutral gray and white, with only faint traces of olive buff; the antemedial line is whitish, distally defined by darker shading on both sides. The fore tibiae are almost entirely white in both females.

Expanse.—Male 32 mm.; female 30–32 mm.

Type.—Cat No. 27356, U. S. N. M.

Habitat.—Bozeman, Montana.

Described from male type, one male and two female paratypes reared from "loco" July 10 and 15, 1924, and received from J. R. Parker, Associate Entomologist of the Montana Agricultural Experiment Station.

A CORRECTION.

By Thos. E. Snyder, *U. S. Bureau of Entomology.*

Through a typographical error, the termite described in "A New Subgenus of *Nasutitermes* Banks (Isoptera)," Proceedings of the Entomological Society of Washington, vol. 26, no. 1, pp. 20–22, 1924, namely, *Nasutitermes* (*Obtusitermes*) *biforma* Snyder, the ending *is* was printed as *a* (*biforma* instead of *biformis*). I take this opportunity of changing the name of this species to *Nasutitermes* (*Obtusitermes*) *biformis.*

Actual date of publication, October 9, 1924.

Some months ago the newspapers told of a certain rich lady of large animal sympathies who, dying, bequeathed a fortune—something over eight hundred thousand dollars—to an eleemosynary institute for needy cats and dogs. This calls for no contemptuous comment. Any charitable impulse that extends itself beyond one's more or less deserving relatives should be encouraged. We trust the unattached Tabbies and Toms and the "high yallers" of dogdom are properly grateful. But upon reading such a piece of news the thought at once suggests itself: why is not some one moved to a similar generosity toward Entomology? We are not suggesting a "home"—or anything of that sort—for superannuated Entomologists. (The proper and decent thing for an Entomologist to do, when he has passed his period of usefulness, is to go off somewhere quietly and die. He doesn't; but that is another story.) We are not intimating that his labors in behalf of posterity and general enlightenment should be more amply rewarded. The true Entomologist is a stoic. He looks for reward neither here nor hereafter. We do, however, submit that Entomology needs and deserves substantial endowment for research and the publication of large scale works; and such endowment, in the nature of things, would have to come from some private person or persons philanthropically inclined and imaginative enough to appreciate the contribution of pure-science Entomology to humanity.

The economic importance of Entomology is pretty generally recognized; and national and state governments and several of our colleges expend considerable sums upon insect studies as these relate directly to agriculture, forestry, animal husbandry, hygiene and the control generally of noxious and beneficial insects. Part of this money goes to the support of pure research; but the support is inadequate; for, while men of science realize that applied science must depend upon such research, the popular mind does not. When it comes to publication facilities the situation is even worse. The various entomological journals are published mostly by societies with relatively small membership and are supported almost entirely by the dues of members and subscribers. They can care for only a limited number of short papers. In addition the museums publish Proceedings, Bulletins and Memoirs, a certain percentage of which can be devoted to larger insect papers. But here the pinch of economy is strongly felt. Anything of monographic size has a hard time finding a publisher.

Now it does seem that in a country as rich as ours, a major science should prosper better than this. Perhaps we Entomologists are to blame. We have not touched the imagination of those who could help us. What shall we do to better our state? 'Tis a sad one. The melancholy Tomcat goeth away fed. The Entomologist sitteth with Lazarus without the gate.

—*Carl Heinrich.*

NOTES AND NEWS ITEMS

The C. H. Fernald Collection of Lepidoptera.—The entire collection of *Pyralidae*, *Tortricidae* and *Tineidae* of the late Prof. C. H. Fernald of Amherst, Mass., has recently been acquired by purchase by the U. S. Bureau of Entomology and has been deposited in the U. S. National Museum.

The collection contains between 8,000 and 10,000 specimens, mostly determined. Among these are some 400 types, cotypes, and paratypes of American moths by Fitch, Packard, Walsingham, Zeller, Clemens, Chambers, Grote, Hulst, Fernald, Fyles, Fish, Kearfott and Busck.

With the exception of Fernald's own types and those of Fitch and Fish most of these specimens must be rated paratypes, but they undoubtedly represent original and authentic material. There are besides these 400 specimens, a large number of specimens compared with types by Prof. Fernald, Walsingham and Zeller—so-called Homotypes. There are also a large well-determined European collection of *Tortricidae* and many exotic species of this family determined by Meyrick and others.

The collection was contained in a small cabinet of twenty drawers (12½ x 16 inches) and in forty-eight Schmidt boxes. It will be incorporated into the regular systematic collection of the National Museum, each specimen being given a distinctive deep yellow label with the printed legend: "Collection C. H. Fernald."

—*August Busck.*

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PROCEEDINGS OF THE

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THE LIFE HISTORY AND STAGES OF CIMOLUS OBSCURUS STAL (HEMIPTERA).

By Thos. H. Jones, *formerly Entomologist, Louisiana Agricultural Experiment Stations.*

In December of 1916 the writer took a specimen of a coreid bug under a log on batture land of the Mississippi River near Baton Rouge, La. Other individuals were found in similar situations during January, February, and March of the four subsequent years. As the writer was not acquainted with the species specimens were sent to Mr. H. G. Barber and he identified them as *Cimolus obscurus* Stal. Thanks are due Mr. Barber for his kindness in determining specimens sent him and for the assistance he has given in the preparation of this paper.

It was not until July of 1920 that any knowledge of the food-plant of the bug was obtained. On July 26, 1920, an adult, several nymphs, and a cluster of eggs from which nymphs had issued were found on and beneath a wild cucurbit vine This plant was later determined by Dr. S. F. Blake of the U. S. Bureau of Plant Industry as the creeping cucumber, *Melothria pendula* L. This is the only plant upon which the insect has been found breeding though other wild and cultivated cucurbits, upon which species of the closely allied genus Anasa feed, have been carefully examined from time to time.

Since its food-plant was ascertained the various stages of the bug have been quite easily obtained in the field and it has been carried through its various stages on this plant in confinement. Dr. J. K. Small, in his Flora of the Southeastern United States, states that *Melothria pendula* grows in swamps and light soil from "Pennsylvania to Missouri, Florida, Texas, and Mexico." At Baton Rouge it is quite commonly found on open land, usually occurring among a growth of grass, vines, or shrubs.

DISTRIBUTION.

Stal, in connection with his original description of the species,[1] mentions its occurrence in Texas and South Carolina. It appears that since then no additional information regarding its

[1]Stal, Carl. Enum. Hem., I, p. 189. 1870.

distribution has appeared in the literature. All specimens seen by the writer have been collected in the vicinity of Baton Rouge.

DESCRIPTION OF STAGES.

The Adult.

The original description by Stal is as follows:

"Griseo-flavescens, supra infuscatus, sat dense nigropunctatus, punctis nigro-cinctis; antennis, vitta latissima capitis, membrana, dorso abdominis, connexivo, maculis duabus marginalibus segmentorum ventris, interdum in unam majorem confluentibus, maculis parvis lateralibus ventris in seriem dispositis, pedibusque nigris, his articuloque primo antennarum obsolete pallido-conspersis; alis fuscis; linea longitudinali anteriore marginibusque lateralibus anticis thoracis obsolete pallescentibus, his nigro-subgranulatis, ante medium obsolete denticulatis, angulis anticis in dentem prominulis; maculis minutis duabus marginalibus margineque basali segmentorum connexivi griseo-flavescentibus; macula basali media membranae sordide albida, parva. ♂Long. 13, Lat. 5 mill.

"Patria: Texas, Carolina meridionalis. (Mus. Holm.)

"C. *vitticipiti* maxime affinis, differt praesertim thoracis marginibus lateralibus nigro-granulatis et multo minus distincte denticulatis. Pectus remote punctatum, punctis ad coxas sitis nigris, macula media laterum mesostethii et metastethii laevi. Venter plus minus distincte fusco-varius, obsolete punctulatus."

The adult, as well as the egg and nymphal stages, resembles in a general way that of various species of Anasa. As has been mentioned by Fracker,[1] the adult may be separated from Anasa adults by the length of the rostrum. In the genus Cimolus the rostrum is short, scarcely surpassing the anterior coxae, and the first segment does not extend behind the eyes. In Anasa the rostrum is longer, attaining or surpassing the intermediate coxae, and the first segment surpasses the posterior margin of the eyes.

The adult, egg, and the five nymphal stages are shown in the accompanying illustrations made from photographs of specimens collected at Baton Rouge.

In color the adult very much resembles the form of *Anasa tristis* DeG. found in the Eastern United States. The ground color of the head, thorax, abdomen, and appendages, except the dorsal surface of the abdomen and the membranous portions of the primaries and all of the secondaries, is of a yellowish or grayish brown. On the relative abundance of the small black tubercles, from which arise short setae, occurring on all but the portions excepted in the previous sentence, depends the shade of color of these parts. Because of this the dorsal surface of the insect, with wings folded, is dark brownish or black, whereas the ventral surface is noticeably lighter in color.

[1]Fracker, S. B. A review of the North American Coreini (Heteroptera). *In* Anns. Ent. Soc. Am., Vol. XVI, No. 2, p. 165–173, 1 fig., pl. X. 1923.

Measurements of five mounted male specimens gave an average length of 12.4 mm., an average width of thorax of 4.6 mm., and an average width of abdomen of 5.5 mm. Five females had an average length of 13.8 mm., an average width of thorax of 5.1 mm., and an average width of abdomen of 5.8 mm. The spine above the base of the antenna is about 0.15 mm. long.

The Egg.

The egg resembles a miniature mussel shell in shape. It is flattened on three sides, being triangular in outline when viewed from either end. Viewed from above it is nearly elliptical in outline and when viewed from the side it approaches a semicircle in outline, being rounded above and flattened below. Near the center of the under surface there is a small projection by which the egg is attached to the surface upon which it is placed.

The surface of the egg is glistening. Under the microscope it is seen to be delicately reticulated and divided into hexagonal areas. There are about 14 chorial processes. When first laid the egg is whitish but later becomes darker and finally reddish brown.

Five eggs gave an average length of 1.7 mm., an average width of 1.1 mm., and an average height of 1.0 mm.

Nymphal Stages.

First Stage.—Head glistening black. Eyes dark reddish brown. Antennae glistening black; with 2d and 3d joints flattened, others cylindrical. Beak for the most part light in color, but dusky at base and tip. Thorax, except for small, light green, central area on posterior dorsal surface, and larger central area of same color on posterior ventral surface, glistening black. Legs glistening black. Abdomen glistening, sides and apex dark purplish, two dorsal tubercles yellowish, remainder light green. Surface of body, antennae, and legs have numerous tubercles, bearing black setae. Abdominal segments 3 to 7, inclusive, each have two prominent black tubercles, one on either side margin, pointing outward and upward, each bearing a black seta. Length about 2.0 mm. (In connection with the length the measurements given for all stages are for individuals that have recently entered the instar, but are fully colored. There is little increase in length simply because of molting; the greater part of the increase in size coming during the instar.)

Second Stage.—Head, thorax, and abdomen dull, not glistening as in first stage. Covered with "bloom" that gives them a light gray color. With this removed color is much as in first stage. Lateral abdominal tubercles differ from those of first stage. These are now noticeable on segments 1 to 7, inclusive; those on segments 4 to 7, inclusive, largest and of about equal size. Of those tubercles on segments 1 to 3, inclusive, those on segment 1 are smallest and those on segment 3 largest. Besides the apical setae the tubercles on segments 3 to 7, inclusive, bear setae on their sides. Between each two of the tubercles there is a smaller one bearing a seta at its apex. Length about 3.0 mm.

Third Stage.—Differs little from 2d stage. Thorax now shows developing wing-pads and the tubercles on the sides of the abdomen are somewhat less prominent than in the 2d stage. Color of the thorax and abdomen, when

"bloom" is removed, of a greenish gray, the thorax being the darker, and with the numerous tubercles over the surface showing as darker spots. Length about 4.5 mm.

Fourth Stage.—Differs considerably from 3d stage. The wing-pads are better developed and the tubercles on the sides of the abdomen less noticeable. The general color of head, thorax, and abdomen is usually of a darker gray, mixed with light yellow; the light yellow prevailing along the sides of the thorax and abdomen. The ventral surface of the body is darker than the dorsal. Antennae and legs have lost their glistening appearance, due to their now having "bloom" on them, and are dull, dark gray. Head, thorax, abdomen, antennae, and legs are thickly dotted with small black tubercles from which arise short setae. Length about 7.0 mm.

Fifth Stage.—The coloration of this stage is usually somewhat darker than that of the 4th, the "bloom" not being so noticeable. The main differences between it and the 4th are, however, that the wing-pads are still further developed and the tubercles on the sides of the abdomen have disappeared. The spine on the head is also now apparent. The 2d and 3d antennal joints, which have become less flattened with each succeeding molt, are now nearly cylindrical. Length about 11.0 mm.

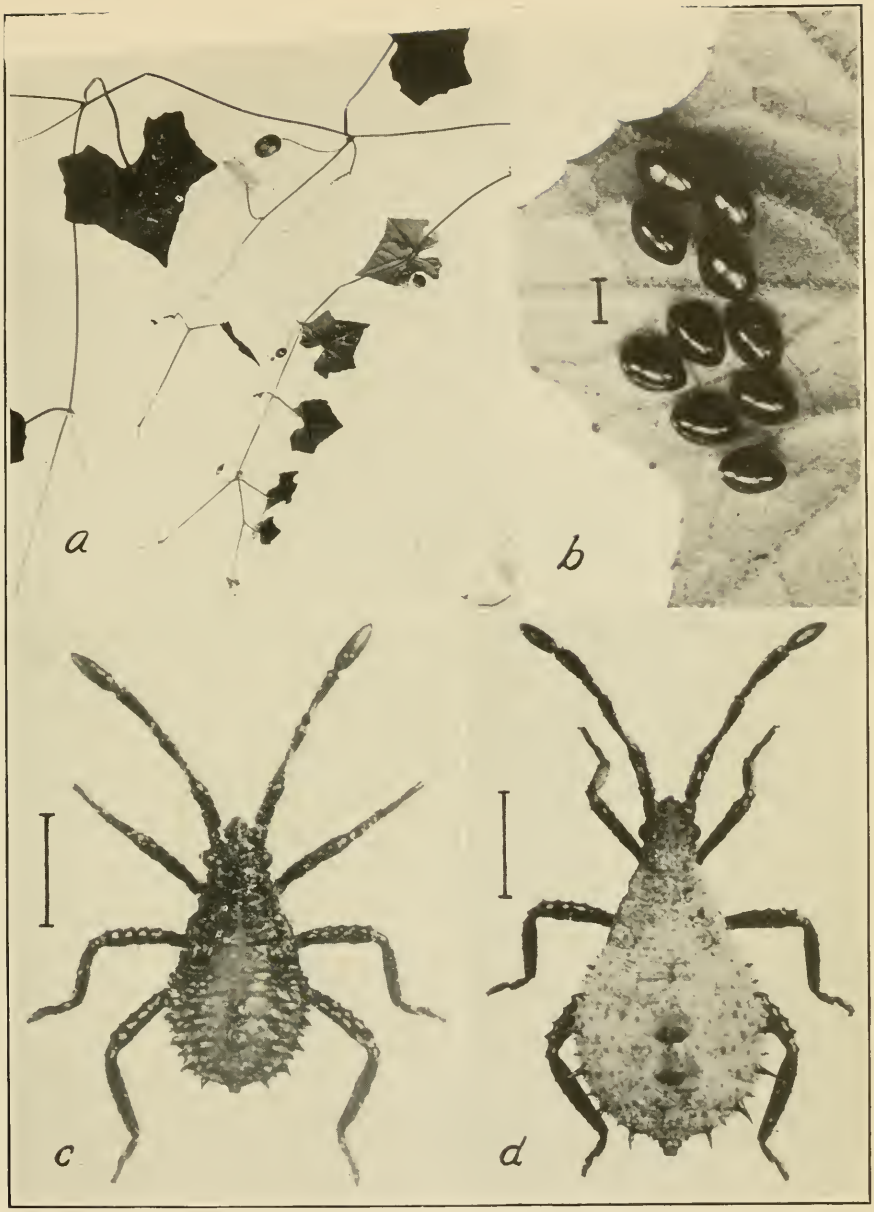
LIFE HISTORY AND HABITS.

The winter is passed at Baton Rouge in the adult stage. From December to March, inclusive, adults have been found hibernating under bark and under logs. Adults have been noted on plants of *Melothria pendula* in the field from April to November, inclusive.

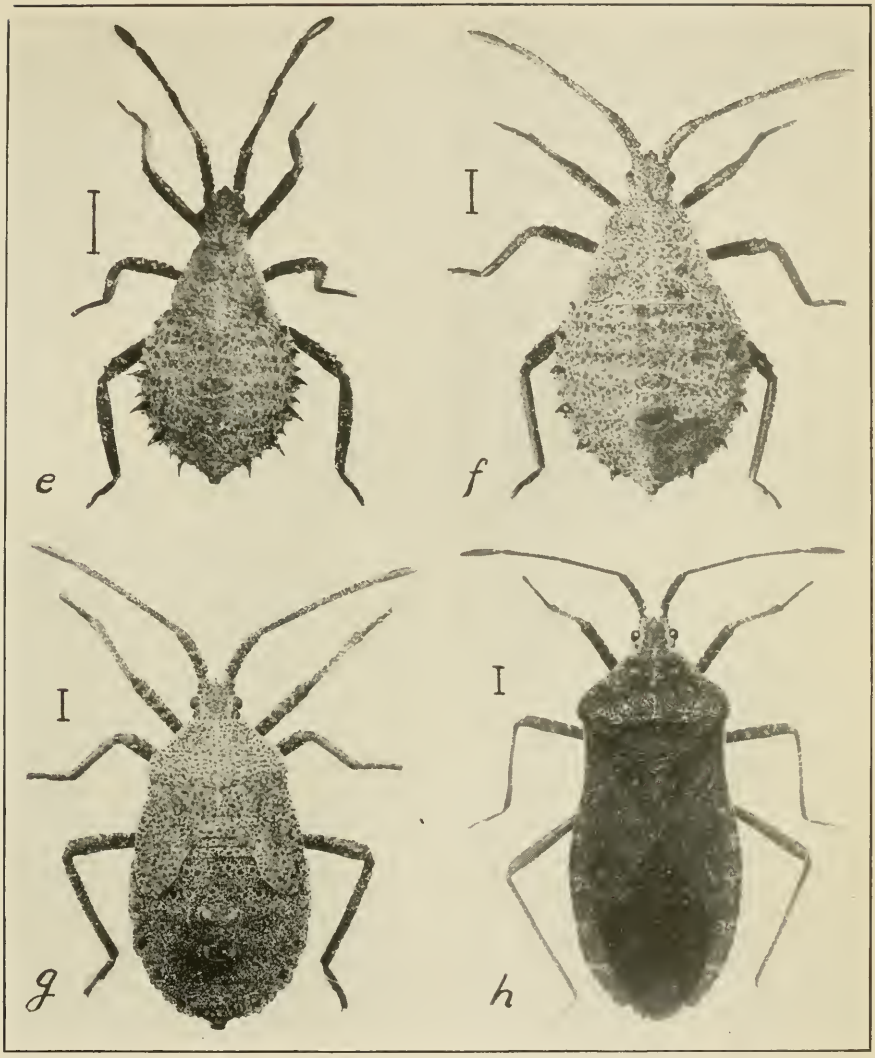
The eggs are usually laid on the under sides of the leaves of the host plant, though they may be placed on other parts of the plant or on objects nearby. They are deposited rather close together in irregular groups. Eighteen egg-clusters contained an average of 12 eggs, ranging from 7 to 23 eggs per cluster.

The first-stage nymph apparently does not feed, but nymphs in the later stages, as well as the adults, have been observed feeding on the stems and fruit of *Melothria pendula*. While they are often common on and about this plant no noticeable injury that could be ascribed to their feeding has been noted.

The number of generations that develop during a year has not been ascertained. A third-stage nymph has been found in the field as early as May 16 and a fourth-stage nymph as late as October 5. The following table gives results relative to the length of egg and nymphal stages obtained in outdoor cages during 1921; the nymphs being reared on growing plants of *Melothria pendula*.



JONES—CIMOLUS OBSCURUS



JONES—CIMOLUS OBSCURUS

TABLE

Showing length of instars, based on record for first individual.

Eggs laid	Eggs hatched	Second instar	Third instar	Fourth instar	Fifth instar	Adult
Date not noted	May 23	May 26	June 1	June 7	June 13	June 21
June 11	June 22	June 25	July 1	July 4	July 11	July 21
June 16	June 27	June 29	July 4	July 10	July 16	July 25

EXPLANATION OF PLATES 9, 10.

Plate 9. a—Sprig of *Melothria pendula*. Food-plant of *Cimolus obscurus*. Reduced.

b—Egg-cluster of *Cimolus obscurus* on under side of leaf of *Melothria pendula*.

c—Nymph of *Cimolus obscurus* in first instar.

d—Nymph of *Cimolus obscurus* in second instar.

Lines beside egg-cluster and nymphs represent a millimeter enlarged in same proportion as the egg-cluster and nymphs.

Plate 10. e—Nymph of *Cimolus obscurus* in third instar.

f—Nymph of *Cimolus obscurus* in fourth instar.

g—Nymph of *Cimolus obscurus* in fifth instar.

h—Adult of *Cimolus obscurus*.

Lines beside nymphs and adult represent a millimeter enlarged in same proportion as the nymphs and adult.

NOTES ON THE GENUS NOCTUELIA. (LEPIDOPTERA: PYRALIDAE.)

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

Genus **NOCTUELIA** Guenée.

Genotype **Cynaeda superbalis** H.-S.

1854, Guenée, Spec. Gén., VIII, Delt. & Pyral., p. 113, *superbalis* sole species and therefore type.

1899, Hampson, Proc. Zool. Soc. Lond., p. 278, type designated *superba* (*melaxantha*), presumably in place of the Herrich-Schaeffer synonymic name evidently considered unavailable. *Aporodes* Gn., *Aporocosmus* Butl., *Semniomima* Warr., *Minioschinia* Warr., listed as synonyms.

Noctuelia rhea Druce.

1898, Druce, Biol. Centr.-Amer., Het., II, 490, pl. XCIV, f. 23, *Panemeria*.

Described from Durango City, Mexico, as a Phalaenid (Noctuid) close to *Anarta*. Two specimens are in the Barnes

Collection from the Baboquivari Mts., Pima Co., Ariz. (O. C. Poling), 1–15 and 15–30 Sept., 1923.

Mr. Schaus possesses a specimen labeled by Hampson *Noctuelia rhea* Druce.

The species does not fit well with the North American forms assigned to the genus *Noctuelia*, but the differences are not great, and no other genus appears to be available.

Noctuelia unicoloralis Barnes & McDunnough.

1914, Barnes and McDunnough, Contr. N. H. Lep. N. A., II, (6), 244, pl. II, f. 15, *Heliothela*.

Appears to be strictly congeneric with *rhea*, and not a *Heliothela*.

Noctuelia costipunctalis Barnes & McDunnough.

1914, Barnes and McDunnough, Contr. N. H. Lep. N. A., II, (6), 244, pl. II, f. 14, *Heliothela*.

This species still further diverges from the bulk of North American *Noctuelia*, but apparently is not a *Heliothela*. Temporarily it may be placed in *Noctuelia*. This eliminates the genus *Heliothela* from our lists.

Noctuelia achemonalis pulcharalis new subspecies.

Entirely similar to *achemonalis achemonalis* (1914, B. & McD., Contrib. N. H. Lep. N. A., II, (6), 243, pl. II, f. 12), but with the basal pink area so extended over the primary as to leave only a narrow band of ochreous.

Forty specimens of typical *achemonalis* are before the authors, with the exception of one New Mexican specimen, all from Arizona.

A single female "cotype" of *achemonalis* is referable to *pulcharalis*. It is the only New Mexican specimen mentioned in the original description, which, in order to include it, reads: "In some specimens the basal pink area extends over half the wing leaving only a narrow band of ochreous."

Type localities and number and sexes of types: Holotype ♂, N. Mex., 24–30 Aug.; Allotype ♀, (cotype of *achemonalis*), Deming, N. Mex., 1–7 Sept.; 2 ♂ Paratypes, So. N. Mex., 23–30 Aug., (O. C. Poling), and San Bernadino Ranch, Cochise Co., Ariz., 3750 ft. (F. R. Snow).

A NON-SUBTERRANEAN TERMITE IN VIRGINIA.

By Thos. E. Snyder, *U. S. Bureau of Entomology, Washington, D. C.*

Species in the genus *Kalotermes* Hagen are of southern distribution, wherever they occur. In the United States, they commonly occur in Florida, Georgia, Texas, Arizona, and California; in the eastern section of this country the light colored *K. marginipennis* Latreille has been found by the writer as far north as Charleston, S. C., where in 1922 it was found damaging cedar telegraph poles in the city. *K. marginipennis* until 1922 had not been recorded as occurring farther north than Savannah, Ga., where it is injurious to telephone and telegraph poles. On the Pacific Coast, *Kalotermes minor* Hagen occurs as far north as San Francisco and Oakland, Cal.

In consequence, it was of great interest to the writer, when on April 7, 1923, H. S. Barber found a dark colored dealated adult of a species of *Kalotermes* in a dead bald cypress tree (*Taxodium distichum*), associated with *Trachykele lecontei* Gory, at Cape Henry, Va., at the base of the sand dunes in "the desert."

This dark colored dealated *Kalotermes*, found at Cape Henry, Va., differed from other American species of *Kalotermes* and I believed it to be a new species. Since only one specimen had been collected, however, I desired more material before describing it as new and on December 15 and 16, 1923, the writer was fortunate enough to find one soldier of *Kalotermes* in a dead standing bald cypress tree with the bark on; this tree was in the process of being covered over by the sand dunes. This proved to be *K. approximatus* Snyder, which had been described in 1920 from the soldier caste alone and had previously only been found in northern Florida. As yet the species does not appear to be common and the impressed pellets of excrement characteristic of its work was found in only a few dead cypress trees, all on the steep back slope of the highest dunes, where the slope is at an angle of nearly 45°. Colonies evidently pass the winter in the interior of wood and had left the outer layers of the wood of these trees.

It is exceedingly interesting to find this termite *K. approximatus* Snyder at Cape Henry, Va., the desert region with its forest of cypress, tupelo gum, magnolia, holly, etc., and the tangle of vines, including yellow jessamine, are characteristic of the flora of Florida. Many tree branches are covered with resurrection fern and mistletoe is common on the gum trees. There is Spanish moss on some of the live oak trees.

Fortunately, as yet, this termite is apparently not damaging telephone or other poles and woodwork.

These non-subterranean termites of the genus *Kalotermes* are destructive to the tops of poles, interior woodwork and furniture in buildings. Their presence in wood may be detected

by the impressed pellets of excrement which they expel from infested wood and the small entrance holes about the size of BB shot. They do not require as much moisture for life as do species of our common native *Reticulitermes* Holmgren.

Where species of *Kalotermes* are common and injurious, the telephone poles, etc., must be impregnated with coal tar creosote for their entire length; since these termites do not necessarily attack the bases of the poles from the ground. Insulation of untreated wood from the ground will not protect the woodwork of buildings from attack by *Kalotermes*, as in the case with *Reticulitermes*. Woodwork must be impregnated with preservatives.

A description of the dealated adult is herewith appended.

Kalotermes approximatus Snyder.

Dealated adult.—Head dark castaneous brown, oblong, slightly longer than broad, rounded posteriorly with fairly dense, long light-yellow hairs. Eyes black, oblong, small, not projecting, separated from the lateral margin of head by a distance equal to their diameter. Ocelli hyaline, white, small, suboval, separated from the eyes by a distance less than their diameter. Labrum pale yellow, much broader than long, narrowed and broadly rounded anteriorly, with long hairs.

Antenna pale yellow, 11 segments (broken) with long hairs; third segment slightly darker—light yellow brown, subclavate, longer than second or fourth segment; the following segments are wedge-shaped and become longer and broader towards the apex.

Pronotum castaneous-brown, not twice as broad as long, widest in middle, roundedly emarginate anteriorly and posteriorly, sides slightly and roundedly slope (narrowed) towards posterior margin; two black slanting linear converging depressions near anterior margin, margins with numerous long hairs.

Wing scale dark-brown, longer than pronotum, with long hairs.

Legs yellow, pubescent, tibiae darker, swollen, spines yellow-brown, pulvillus present.

Abdomen with tergites dark castaneous-brown, with a row of long hairs at the base of each tergite.

Measurements:

Length of entire dealated adult: 7.30 mm.
Length of head: 1.50 mm.
Length of pronotum: 0.90 mm.
Length of hind tibia: 0.95 mm.
Diam. of eye: 0.20 mm.
Width of head: 1.30 mm.
Width of pronotum: 1.60 mm.

K. approximatus Snyder is a dark colored, small eyed species; the eyes are smaller than in the light colored *K. marginipennis*

Latreille, but the pronotum is larger; the eyes are smaller than in *K. schwarzi* Banks; the ocellus is smaller but the eye is larger than in the dark colored *K. minor* Hagen; the eyes, ocelli and pronotum are smaller than in *K. jouteli* Banks; the eyes and ocelli are smaller than in *K. banksi* Snyder.

Described from a single dealated adult collected by H. S. Barber in a dead bald cypress tree on the steep back slope of the high sand dunes (the desert) on April 7, 1923. A soldier collected at the same locality by T. E. Snyder on December 15, 1923, has been compared with the type from Ortega, Fla.

A COLLECTION OF FLEAS FROM THE ISLAND OF HAWAII.

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

Because of the paucity of the mammalian and terrestrial avian fauna of the Hawaiian Islands but few fleas have been taken there. Hence any records from these islands are of considerable interest from the standpoint of zoogeography. Also much economic importance attaches to the occurrence of fleas in these islands. The great influx of Asiatics into the territory and the geographical position of the Hawaiian Group in regard to the commerce of the Pacific exposes them to the constant menace of flea-borne diseases.

Recently the writer has received for determination a collection of fleas made on the Island of Hawaii during the years of 1922 and 1923 by C. E. Pemberton. The collection was sent in by O. H. Swezey, Entomologist of the Experiment Station of the Hawaiian Sugar Planters' Association. Five species are included which were taken from six different hosts. All of these fleas evidently have been introduced, and all are of economic importance, four of them being among the most injurious species of the whole order. The list is here given:

Order SIPHONAPTERA.

HUMAN FLEA (**Pulex irritans** Linnaeus).

HONOKAA.

From dog, *Canis familiaris* Linnaeus; 14 specimens collected Dec. 17, 1922.

ORIENTAL RAT FLEA (**Xenopsylla cheopis** Rothschild).

HONOKAA.

From *Rattus rattus* (variety?); 1 specimen collected Feb. 22, 1923.

From roof rat, *Rattus rattus alexandrinus* (Geoffroy); 1 specimen collected Nov. 21, 1922.

From brown rat, *Rattus norvegicus* (Erxleben); 2 specimens collected Nov. 23, 1922; 1 specimen collected Dec. 11, 1922; 2 specimens collected Feb. 22, 1923; 1 specimen collected Mar. 1, 1923.

CAT FLEA (**Ctenocephalus felis** (Bouché)).

HONOKAA.

From dog, *Canis familiaris* Linnaeus; 2 specimens collected Aug. 29, 1922; 1 specimen collected Dec. 17, 1922.

From mongoose, *Herpestes birmanicus* Thomas; 3 specimens collected Dec. 11, 1922; 1 specimen collected Jan. 22, 1923.

WAIPIO.

From cat, *Felis domestica* Linnaeus; 2 specimens collected at an elevation of 3800 ft. on Nov. 28, 1922.

MOUSE FLEA (**Ctenopsyllus misculi** (Dugés)).

HONOKAA.

From brown rat, *Rattus norvegicus* (Erxleben); 1 specimen collected Feb. 1, 1923.

From house mouse, *Mus musculus musculus* Linnaeus; 1 specimen collected Nov. 1, 1922; 4 specimens collected Nov. 23, 1922.

STICKTIGHT (**Echidnophaga gallinacea** (Westwood)).

HONOKAA.

From mongoose, *Herpestes birmanicus* Thomas; 1 specimen collected Dec. 11, 1922.

From dog, *Canis familiaris* Linnaeus; 3 specimens collected Mar. 10, 1923.

In this list it is interesting to note the presence of *Ctenocephalus felis* (Bouché) but the absence of *Ctenocephalus canis* (Curtis), also the presence of *Xenopsylla cheopis* Rothschild but the absence of *Ceratophyllus fasciatus* Bosc. The cat flea, *Ctenocephalus felis* (Bouché), is stated as occurring in many places in Eastern Asia and also in Polynesia while in most of this range the dog flea, *Ctenocephalus canis* (Curtis), is absent. Along the eastern seaboard of the United States the cat flea is found to predominate very greatly in the north central area and to be the only flea found in most sections in peninsular Florida, while in the central area, as represented by the states of Maryland and Virginia, it is the dog flea that occurs almost exclusively.

Jordan and Rothschild in their comprehensive paper on *Ceratophyllus fasciatus* and allied species, published in "Ectoparasites," 1921, give the world distribution of this rat flea including records for Yokohama and Tokio, for India and for Australia but none for the Hawaiian Islands. These authors described several new species from the Oriental Region which were closely related to *Ceratophyllus fasciatus*.

Mr. Swezey has consented to have the United States National Museum retain some of the slides he sent. The writer has picked out one of each species to be retained by the Museum. Three of these are lot duplicates and the other two, *Ctenopsyllus musculi* Dugés and *Echidnophaga gallinacea* (Westwood), are locality duplicates, though not lot duplicates.

A NEW SPECIES OF PSELLIOPUS (HEMIPTERA: REDUVIIDAE).

By H. G. Barber, *Roselle, N. J.*

Pselliopus latifasciatus, new species.

Form rather broad. Sordid stramineous. Anterior lobe of head, with tylus, fascia running forward from between two small rounded black tubercles to the base of each antenna, a small spot between the eye and base of each antenna, posterior lobe with a broad lateral fascia running back from the eyes and connected near base of head with two broad somewhat crescentic fascia which run forward between the ocelli to connect at the transverse stricture, black; a somewhat quadrangular stramineous spot between the ocelii. Antenna colored as in *cinctus* with the second and fourth segments about equal in length. Pronotum, except for a short median longitudinal black fascia anteriorly, unicolorous, sometimes tinted with orange; scutellum sordid stramineous, with the Y-shaped callosed carina paler and with a whitish pruinose spot at base on either side; corium darker, somewhat ferrugino-fuscous; connexivum with narrow edge, except at incisures, the transverse fasciae outwardly narrow widely expanded within, ferrugino-fuscous; legs stramineous, not spotted but banded with black, the femora with six rings, the tibia with three rings before the middle; sternum and venter not fasciate, the latter with a small round black spot on segments two to six, situated midway between spiracles and middle of venter. Head, antennae and rostrum of the same character as in *cinctus*, the first named however not so abruptly contracted to form the collum which appears somewhat shorter. Pronotum much more setose than in *cinctus;* anterior angle with a prominent, bluntly rounded tubercle directed obliquely forward and set with a seta; posterior angle armed with a prominent horizontal subacute tooth or spine which is directed backwards on a line with the outer margin, sometimes infuscated at tip; anterior lobe with 10 to 12 prominently elevated, rounded tubercles, each set with a long seta; posterior lobe on the elevated disk granulate or provided with numerous scattered low tubercles beset with setae; the disk not so sharply delimited laterally as in *cinctus;* posterior margin before scutellum weakly bi-sinuate. Scutellum a little more widely foliaceous than in *cinctus*. Corium with a rather dense coating of fine appressed hairs. Membrane brownish hyaline. Connexivum rather widely expanded and reflexed; extreme edge fuscous except just before incisures which are somewhat callosed; the transverse fusco-ferrugineous fascia narrow where it joins the margin just back of the incisures, widely expanded within. Terminal genital segment of the male entire, slightly produced at apex in a short, stout, rather obtuse process, the posterior margins either side of process plainly callosed; the projecting genital lobes nearly straight, scarcely clubbed at apex, outwardly black.

Length male: 11 mm.; width of abdomen 4.5 mm.

Habitat.—Type: male Keatchie, La., VI, 14, 1905 (U. S. N. M. coll. La. Crop. Pest Comm.). Paratypes: males—Chain Bridge, Va. (U. S. N. M., D. H. Clemons Coll.); Boulder, Colo., Mch., Texas (U. S. N. M.); Plummer's Is., Md., IV, 5, 1914 (Coll. W. L. McAtee); La Hunta, Colo. (Oslar—my coll.): females—

Willis and Gurley Tex., VI, 9, 1905 (U. S. N. M.); Plummer's Is., Md., VII, 27, 1913 (my coll. from W. L. McAtee).

Type and *paratypes*.—Cat. No. 27156 U. S. N. M.

This species is most closely related to *tuberculatus* Champion, from which it differs much in coloration. The femora are not spotted but only annulate with fuscous. In some specimens the anterior lobe of pronotum is tinted with orange and the connexivum beneath is occasionally transversely fasciate with fuscous.

Key to U. S. Species of Pselliopus.

1. Femora speckled and annulate with fuscous, tibiae annulate throughout. Anterior lobe of pronotum furnished with rather long, acute spines; posterior lobe with scattered small, black tubercles; the two anterior pronotal spines rather slender, directed forward (Mexico, Ariz., Nev., Calif., Ore., and Wash.) ..... *spinicollis* Champ.

   Femora only annulate with fuscous. Anterior and posterior lobes of pronotum either unarmed or provided with tubercles; the two anterior pronotal spines stout, directed obliquely forward ..... 2.

2. Anterior lobe of pronotum quite setose, furnished with 10–12 prominent rounded tubercles; posterior lobe with numerous small setose tubercles or granules. Tibia annulate toward base only. Connexival fascia widely expanded within (Md., Va., La., Tex., Col.) ..... *latifasciata* n. sp.

   Anterior and posterior lobes of the pronotum smooth, unarmed ..... 3.

3. Process of the genital segment of male sucate or divided at apex. Head, anterior lobe of pronotum, pleurae and venter strongly fasciate with fuscous; posterior lobe of pronotum commonly reddish; anterior median longitudinal sulcus extended past middle of posterior lobe as a shallow groove; posterior margin before scutellum very feebly bi-sinuate, nearly straight; humeral tooth well developed (C. Amer., Mex., Ariz., Calif.) ..... *zebra* Stal.

   Process of the genital segment of the male entire. Deep median, longitudinal groove of the anterior lobe of pronotum, not at all or only faintly indicated on the posterior lobe ..... 4.

4. Lateral angles of the pronotum unarmed, either nodose or rounded; posterior margin before scutellum strongly bi-sinuate. Genital process stout, not much produced (Mex., Ariz.) ..... *inermis* Champ.[1]

   Lateral angles of the pronotum provided with either a subacute black tubercle or a spine; posterior margin more feebly bi-sinuate ..... 5.

5. Lateral angles of pronotum provided with an obvious, subacute spine which projects beyond humeral angles. Anterior lobe of pronotum strongly trifasciate with black; posterior margin before scutellum quite evidently bisinuate. Genital process of male rather stout and blunt not spinose (U. S. east of Rocky Mts.) ..... *cinctus* Fab.

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[1]Specimen from Huachuca Mts., Ariz., in my collection, with pronotum fasciated as in Chihuahua specimen mentioned by Champion, B. C. A. p. 247.

Lateral angle of pronotum provided with a short, stout, usually acute, black tubercle which does not project beyond the humeral angles. Anterior lobe of pronotum non-fasciate; posterior margin before scutellum quite or very nearly straight. Genital segment of male armed with a rather long, erect, spinous process (East states from Md. to So. C., west to Kans., and south to La. and Tex.) ..... *barberi* Davis.

ON THE CORRECT NAME FOR THE BROWN-TAIL MOTH.

By Wm. Barnes and F. H. Benjamin, *Decatur, Illinois.*

Both Rothschild, 1917, Nov. Zool., XXIV, 355 and Swinhoe, 1922, Ann. & Mag. Nat. Hist., (9), X, 480 have called attention to the fact that the Brown-tail Moth usually known as *Euproctis chrysorrhoea* Linn. should be called *Nygmia phaeorrhoea* Donovan.

Lord Rothschild clearly proves that *Euproctis chrysorrhoea* Linn. is not applicable to the Brown-tail Moth, but to the Gold-tail moth, another common European pest, which has previously been known as either *Porthesia similis* Fuessl. or *auriflua* D. & S. (Fabr.). The name *auriflua* Esp. (1785) occasionally applied throughout the early literature to the Brown-tail Moth is either a homonym of *auriflua* D. & S. (1776) (both having been placed in *Bombyx*), a misuse of the name, or a misidentification of the name, in any case unavailable nomenclatorily.

The genus *Nygmia* Hubner, type *Phalaena* (*Bombyx*) *icilia* Stoll., designated by Kirby, 1892, Syn. Cat. Lep. Het., p. 448, appears to have priority, as stated by Rothschild and Swinhoe. Judging from Swinhoe's Revision, Kirby's Catalogue, and Hampson's Fauna Brit. Ind. the following genera are congeneric, in a broad sense: *Urocoma* H.-S. (type *limbalis*); *Lacipa* Wlk. (type *picta*); *Artaxa* Wlk. (type *guttata*); *Antipha* Wlk. (type *costalis*); *Dulichia* Wlk. (type *fasciata*); *Lopera* Wlk. (type *squamosa*); *Arna* Wlk. (type *apicalis*); *Somena* Wlk. (type *scintillans*); *Uitidava* Wlk. (type *incomptaria*); *Cozola* Wlk. (type *leucospila*); *Adlullia* Wlk. (type *lunifera*); *Themaca* Wlk. (type *comparata*); *Orvasca* Wlk. (type *subnotata*); *Bembina* Wlk. (type *apicalis*); *Microgymna* Wallgrn. (type *picta*); *Gogana* Wlk. (type *atrosquama*); *Chaerotricha* Felder (type *atrosquama*); and *Tephothrix* Holland (type *lanaria*).

Most of these genera are either monotypic or have the type designated by their author. Where such is not the case, Kirby and Swinhoe agree except in the case of *Nygmia*, the type of which is listed by Swinhoe as *phaeorrhoea* which is not an included species; and *Chaerotricha*, the type of which is listed by Swinhoe (1922) as *conspersa*, an *ultra vires* designation, Kirby (1892) having designated *atrosquama* as type, possibly because listed by Felder as a synonym of *glandulosa*, but probably for synonym *glandulosa*.

NORTH AMERICAN SPECIES OF FERDINANDEA (DIPTERA: SYRPHIDAE).

By Raymond C. Shannon, *U. S. Bureau of Entomology.*

All the types of the American species of *Ferdinandea* (= *Chrysochlamys*) which have been previously described are in the Museum of Comparative Zoology, Cambridge, Mass. The writer wishes to thank Mr. Samuel Henshaw and Mr. Nathan Banks for the opportunity of examining them and other types of the Osten-Sacken-Loew collection upon which it is intended to base certain other writings.

The species of this genus are very closely related. The number of thoracic bristles affords good diagnostic characters and as their use simplifies the determination of the species they have been added in the key. The male genitalia are so similar among the species that they can be used with little advantage.

The chaetotaxy of the genotype, *cuprea* Scopoli (European), is here given. Four notopleurals; three supraalars; one intraalar; 1 postdorsocentral; 1 postacrostichal; 4 postalars; ten marginal scutellars; four mesopleurals. It differs chiefly from our species by the possession of the intraalar.

A. Four notopleurals; abdomen entirely bright bronze-green; petiole beyond first posterior cell as long as discal crossvein. (Western U. S. and Canada ..... *croesus* O. S.

AA. Three notopleurals; post margins of second and third tergites opaque black; arista yellowish; petiole beyond first posterior cell shorter than discal crossvein. (Oregon, New Mexico?)..... *aeneicolor* n. sp.

AAA.[1] Two notopleurals; post margins of second and third tergites opaque black[1]; arista yellowish basally; petiole about as long as discal crossvein.

B. Six scutellars; facial spot indistinct in outline; fore femora and tips of all tarsi dark brown. (Va., N. J., Pa., N. Y.) ..... *buccata Loew*

BB. Eight or more scutellars; face in middle with a V-shaped black mark.

C. Legs reddish yellow. (East of Miss. R.)..... *dives* O. S.

CC. Femora and tibiae brownish. (Mass., N. H.)..... *nigripes* O. S.

Ferdinandea aeneicolor, new species.

Male.—Head a little broader than high; ocellar triangle with black loose pile; frontal triangle with silvery pruinescence and pile except along anterior margin; antennae moderate, dark brown except lower portion of third joint which is yellowish; third joint subquadrate; arista reddish yellow, darker apically, longer than length of antennae; face yellow with pollen and pile except on the broad

[1]The type female is a teneral specimen and faint traces of the dark borders can be seen in good reflected light.

and shining brown tubercle. Mesonotum dark aeneous with two longitudinal grayish pollinose vittae; pile yellowish and black intermixed; one postacrostichal; one postdorsocentral; three notopleurals; three supraalars; three postalars; eight marginal scutellars; four mesopleurals. Femora brown, yellowish apically; fore tibia brownish; tips of all tarsi brown. Post margins of second and third tergites opaque black, on second tergite the black extending as a slender prolongation to anterior margin. Wings smoky, a distinct cloud in middle of wing and another on the discal crossvein. Squamae and halteres yellow. Length 11 mm.; wing 10 mm.

Type.—Cat. No. 27261 U. S. National Museum. One male, Forest Grove, Oreg., Sept. 18, 1919 (L. P. Rockwood).

A male specimen from Pecos, N. Mex., June 15 (Grabham) agrees in all characters noted above and is provisionally placed with this species.

Dr. F. R. Cole informs me that he has this species in his collection, also from Oregon.

A NEW SAWFLY OF THE FAMILY XYELIDAE (HYMENOPTERA).

By S. A. Rohwer, *U. S. Bureau of Entomology*.

Odontophyes bicoloripes, new species.

This interesting species differs from the genotype, *Odontophyes avingrata* (Dyar), in the partly rufous legs and mesepisternum.

Female.—Length (to the end of abdomen), 7.5 mm.; length of ovipositor 1.5 mm. Frons coriaceous on a granular surface; middle fovea obsolete but replaced by an impressed line from the anterior ocellus; vertex and orbits finely granular; postocellar and vertical furrows obsolete; fourth antennal joint one-fifth longer than the fifth; thorax above granular; tergites, except the apical one, finely transversely aciculate; sheath straight below, acute at apex, regularly convex to base. Black, with a strong, metallic, blue luster on the tergites and with a faint cupreous luster on the head and thorax; clypeus, mandibles and tegulae stramineous; mesepisternum, sternum and basal sternites rufous; legs rufous except the apices of the hind femora, the entire hind tibiae and basitarsi; posterior trochanters and the four apical joints of the hind tarsi white; wings hyaline, venation dark brown.

Type locality.—Agricultural College, Mississippi.

Described from a single female collected April 6, 1915, by A. E. Barbarin. Received for identification from M. H. Smith, of the Mississippi Agricultural College.

Type.—Cat. No. 26040 U. S. N. M.

THE GENERIC NAMES OF THE CLOVER AND ALFALFA WEEVILS HYPERA AND PHYTONOMUS.

By H. S. Barber, *U. S. Bureau of Entomology.*

An editorial footnote in the Review of Applied Entomology, volume 12, Series A, page 24, reads:

"The name *Phytonomus*, Schh., is an absolute synonym of *Hypera*, Germ., and therefore cannot be used for any division of that genus. In any case, there is no really satisfactory line of division between the winged and wingless species of *Hypera*.—Ed."

An examination of the original publications of the two genera substantiates the conclusions of Titus 1911 (Ann. Ent. Soc. Amer. vol. 4, p. 386), except that the writer believes *Hypera* to be valid in 1817 instead of 1821, for if modern systematists can establish new genera by designating a described species as genotype, we can hardly object to the establishment of genera a century ago by authors listing the known species to be included in the proposed new genus. *Curculio punctatus* is an originally included species and its designation as type of *Hypera* by Curtis (1826), together with Schoenherr's designation of *Rhynchaenus polygoni* as type of *Phytonomus* in the original description the same year, 1826, has been discussed by Titus.

Through increased knowledge our concepts of groups change, and genera may be united through intergradient species, but the opposed opinions here evident probably result from divergent methods of consideration—the Linnaean idea of delimiting a genus by characterization as opposed to the more recent practice of selecting one species as type of a genus. In our present state of systematic uncertainty the grouping of related species about a nucleus, or genotype, induces a better concept of relationship than can be obtained by a consideration of the constantly changing limits assigned to genera in their successive treatments. *Hypera* and *Phytonomus* would perhaps be "absolute synonyms" if considered on the basis of the original group of species but the designation of their genotypes almost a century ago demands a different procedure. If genera have identical genotypes their genonyms are *absolute* synonyms; if genotypes are congeneric (sensu stricto) their genonyms are synonyms, but if the genotypes fall into different specific groups, as appears to be the case with *punctata* and *polygoni*, the genonyms should be retained for those subgeneric groups until our concepts of classification change.

If the editor responsible for the footnote in question knows unstated facts invalidating Titus' conclusions it is hoped that he will have them put on record.

Actual date of publication, November 19, 1924.

EDITORIAL.

In a recent number of the Journal of the American Medical Association there appeared an editorial under the caption *Medicine and Mathematics*. After discussing the nomenclature and attitude of the recent literature and the inability of the average medical man to grasp the method of presentation, the author continues: "How will the physician react when he finds his educational advance blocked in this way? Many will probably give up in despair and will turn aside into those paths in which mathematics is not so essential. A few will study enough to understand something of what is going on; will learn enough, in fact, about some of the methods of the mathematician so that when faced with certain problems they will call in experts who can fit curves for them, can calculate formulas, can make nomographic charts or can evaluate statistical data. Another few, particularly the younger men, will see clearly that much of the future advance in medicine must go through the field of physical chemistry; will face their deficiencies squarely, and will go back to their books or to college for the requisite knowledge."

In entomology as in medicine this same situation presents itself. And the result will be the same. The leaders of the future will be those who see clearly and facing their deficiencies squarely, go back to their books or to college. But they will go back to study *that which they do not know*. Most of us take the easier path. We go back to examine a field we have already explored. We return as ignorant as we went. The going, though good in itself, will not so much help us. It is what we bring with us when we come back that counts.

—*A. C. Baker.*

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TWO NEW SPECIES OF CEUTHOPHILUS FROM THE CARLSBAD CAVE IN NEW MEXICO (ORTHOPTERA).

By A. N. Caudell, *U. S. Bureau of Entomology.*

The extensive caverns at Carlsbad, New Mexico, known as the Carlsbad Cave, were visited during the present year by an expedition under the auspices of the National Geographical Society. Mr. Vernon Bailey, of the Biological Survey of the U. S. Department of Agriculture, was a member of this expedition and at his invitation Mr. O. G. Babcock, of the Federal Bureau of Entomology, accompanied the party. Mr. Babcock's assigned duties were to collect insects in the caverns, which he assiduously did, the Orthoptera secured being submitted to the writer for determination. In addition to the material collected by Mr. Babcock there were also received a couple of specimens collected in the cave by Mr. Bailey.

All the above material, twenty-two specimens in all, comprises but two species, both belonging to the genus *Ceuthophilus*, and neither apparently hitherto described. They are therefore herein characterized as new species.

Ceuthophilus carlsbadensis, new species.

Description.—♂ and ♀. A medium sized unicolorously brown species. Head smooth, vertex without horn-like projection, being almost entirely smooth; eyes black, pyriform, the point ventral. Pronotum smooth.

Legs rather short and stout; fore femora noticeably longer than the pronotum and armed on the inner ventral margin with four or five distinct spines, the opposite margin entirely unarmed; middle femora armed beneath on each margin with four to six spines and above with a long genicular spine on the hind margin; hind femora in both sexes somewhat over three times as long as broad, the apical fifth only parallel, and armed beneath on both margins for almost the entire length with numerous short sharp triangular teeth, no longer than the basal width; above in the apical half these femora are furnished with numerous acute posteriorly directed spinule-like tubercles and the ventral sulcus is moderately broad; fore and middle tibiae in both sexes armed beneath with four pairs of spines inclusive of the apical ones, the anterior pair unarmed above, the intermediate pair with a single median pair of spines and sometimes with one or two additional ones, and the posterior ones, which are straight in both sexes, with a single median subapical ventral spinule; the dorsal spines of the hind tibiae, of which there are five pairs, diverge very noticeably, are decidedly longer

than the width of the tibia and are separated by spaces approximately twice their length; the inner apical calcars are longer than the outer ones, the median ones the longest, the inner median one being one-half as long as the posterior metatarsus; tarsi long, those of the fore and middle legs about two-thirds as long as the tibiae and those of the hind legs one-half as long as the tibia; posterior metatarsus approximately as long as the rest of the segments together, the second segment twice as long as its apical depth and about twice as long as the third segment.

Abdomen smooth in both sexes; ninth dorsal segment in the male, as viewed from above, completely hidden beneath the eighth, which is apically prolonged above and slightly beyond the ninth and with the apex truncate and rather conspicuously swollen; supraanal plate of both sexes small, triangular; depressed; subgenital plate of male large and subquadrate, the apex deeply notched triangularly, the lateral angles thick and broadly rounded, of the female small, triangular with the apex rounded and entire; cerci of both sexes simple, about as long as the pronotum and twice as long as the femoral width; ovipositor short, the ventral teeth of the inner valves five in number, counting the apical curved ones, the terminal three the longer and all rather slender, almost entirely chitinized and sharply pointed, the outer valves at the apex on the dorsal margin with a short sharp chitinous upwardly and posteriorly directed point.

Measurements.—Length, total from front of head to end of abdomen, ♂ and ♀, 15 mm.; pronotum, ♂ 4, ♀ 4.75 mm.; anterior femora, ♂ 6, ♀ 7 mm.; posterior femora, ♂ 10, ♀ 11 mm.; posterior tibiae, ♂ 11, ♀ 12 mm.; ovipositor, 6 mm. Width, posterior femora at widest part, ♂ 2.3 mm., ♀ 3 mm.

Type, Allotype and Paratypes.—Cat. No. 27476 U. S. N. M.
Habitat.—Carlsbad Cave, Carlsbad, New Mexico.

Described from seven specimens, one adult male, three adult females, and three male nymphs, as follows: type male, and allotype female (both adults), April 24, 1924, bearing the collector's No. 11241; Paratype A, adult female, Apr. 26, Coll. No. 11512; Paratype B, adult female April 23, Coll. No. 11239; paratypes C, D and E, immature males, same data as the type and allotype.

Structurally this uniformly somber colored species seems the most nearly allied to the eastern *C. nigricans*. There are a number of very distinct characters, however, which will serve to separate the opaque unicolorous western form from its shiny brown and usually dorsally striped eastern relative. Thus *nigricans* has but one ventral spine in the inner margin of the fore femora, rarely two, the teeth of the ovipositor are less chitinized and not quite so sharp, the posterior tarsus is but about one-third as long as the corresponding tibia, the middle apical calcar on the inner side of the hind tibia is two-thirds or more as long as the posterior metatarsus and the subgenital plate of the male is apically entire or, usually, briefly triangularly impressed, all of which characters differ from those of the species above described.

The male of *carlsbadensis* also seems somewhat allied to *aridus* Bruner as described by the author of that species; *aridus*, however, has the cerci no longer than the greatest width of the posterior femora while in *carlsbadensis* they are twice as long, and the posterior tarsi are about one-third as long as the corresponding tibia instead of about one-half as long as they are in the cave species. There does not appear to be much resemblance between *carlsbadensis* and the species described under the specific name *ensifer* by Packard from the Nickajack Cave in Tennessee. This latter species, females only of which are known, has been recorded from New Mexico,[1] but probably wrongly so, though just what species was involved is unknown.

As the exact data given in the collector's notes accompanying the insects taken in the Carlsbad Cave may later prove of some value and interest, it has been thought best to include them in the present paper. The notes covering the material comprising the above species are as follows:

11239. "Two crickets; the light colored one[2] taken from between "Devil's sink hole"[3] and Kings Palace; the dark colored one near "Devil's sink hole, April 23." (Two females in this lot.)

11241. "April 24, crickets taken from walls and floor of Cavern between first and second shaft. One large and one young cricket observed on cactus rat carcass that was placed in cave as bait. The young cricket was apparently feeding." (One adult pair and three nymphs.)

11512. "April 26, 1924. Crickets collected about 50 ft. east of West shaft. Depth 170 ft." (One adult female.)

Ceuthophilus longipes, new species.

Description.—♂ and ♀. A very long slender-legged medium-sized species of a uniform yellowish brown color. Head with vertex scarcely at all swollen, without any horn-like projection; eyes black, pyriform, the point ventral, the sides straight, or slightly concave. Pronotum smooth. Legs unusually long and slender; fore femora fully twice as long as the pronotum and wholly unarmed above and beneath, without even genicular spines; middle femora also unarmed beneath but above furnished with a long genicular spine on the caudal margin; hind femora very slender, being about six times as long as broad and with about the apical third subparallel, beneath in both sexes entirely unarmed on both margins, the intervening sulcus very narrow, the lateral carinae in basal part almost or quite meeting, and above the surface is smooth, without any raised points in either sex; fore tibiae unarmed above except for the apical spines and beneath armed with three pairs of spines in addition to the apical ones, the first pair situated about the middle, one near the apex, and one pair between the others, a little nearer the subapical pair; intermediate tibiae armed above with a

[1]Scudder & Cockerell. Proc. Davenp. Acad. Sci., vol. ix, p. 56 (1902).

[2]The "light colored one" mentioned here refers to the second species, as described below.

[3]More commonly known as the "Devil's Den."

single pair of spines just beyond the middle, of which one on the caudal margin is often missing, and beneath armed as in the anterior ones; posterior tibiae decidedly longer than the corresponding femora, straight in both sexes, armed beneath near the distal end with a single small median spine and above with four pairs of spines in addition to the apical ones, the spines very moderately divergent and about twice as long as the tibial width; the apical calcars are long, the inner ones a little longer than the outer ones, the median ones much longer than the others, the inner median one twice as long as the dorsal one on that side and three times as long as the ventral one, being approximately one-half as long as the posterior metatarsus. Tarsi very long and slender, the anterior and intermediate ones about two-thirds as long as their tibiae and the posterior ones about one-half as long, the metatarsi longer than the other segments together and the second segment of the hind tarsus about four times as long as the apical depth and twice as long as the third segment. Abdomen smooth in both sexes, showing no dorsal roughness of any kind; ninth dorsal segment in the male, as viewed from above, extending distinctly beyond the eighth segment, apically briefly extended and very broadly rounded with the posterior margin very slightly concave mesially; seventh and eighth dorsal segments very slightly tectate and posteriorly very gently produced; serci simple, somewhat longer than the femoral width and strongly swollen in the basal half; supraanal plate mostly concealed in both sexes, apparently small and flat; subgenital plate of male large and broad, posteriorly very broadly and shallowly notched, of female small, transverse, apically rounded; ovipositor rather long and slender, almost three times as long as the pronotum, the outer valves apically terminated by a sharp upwardly and backwardly directed point and the inner valves each with four slender sharp teeth in addition to the apical decurved hook.

Measurements.—Length, total from front of head to end of abdomen, ♂ and ♀, about 14 or 15 mm.; pronotum, ♂, 3, ♀, 3.5 mm.; anterior femora, ♂ and ♀, 7.25 mm.; posterior femora, ♂ and ♀, 12 mm.; ovipositor, 10 mm.; width, posterior femora at widest point, ♂, 2, ♀, 2.1 mm.

Type, *Allotype* and *Paratypes.*—Cat. No. 27477 U. S. N. M. Paratypes (A and B) also in U. S. Biological Survey.

Habitat.—Carlsbad Cave, Carlsbad, New Mexico.

Described from fifteen specimens, six male and seven female, apparently adult and one male and one female nymph, as follows: type and allotype, adult male and female, April 23, 1924, collected by O. G. Babcock and bearing collector's No. 11508; paratypes A and B, adult male and female with same data as type and allotype; paratype C and D, adult and half grown nymph females, same data as type and allotype but with No. 11511; paratype E, adult female, same locality on April 24 and with No. 11242; paratype F, same locality data as type and allotype but with No. 11239; paratype G, immature male, probably in first stage, from same locality as the rest and bearing No. 11230; paratypes H, I, J, K, L and M, two males and four females, all adults from the same locality as the rest but taken by Mr. Vernon N. Bailey and bearing no collector's number.

The egg of this insect, one of which was taken from the abdomen of the female collected by Mr. Bailey, is yellowish in color, measures 3 mm. in length by 1 mm. in width and is a little thicker at one end.

This species, some specimens of which were taken in the furthest recesses at which insect life was found and all well beyond the light-penetrated regions of the cavern, does not appear very closely allied to any described form of the genus. The long slender legs are somewhat suggestive of *C. ensifer* Packard but this is a decidedly smaller form with a proportionately much longer ovipositor. The long legs also calls rather vaguely to one's mind the species of the genus *Hadenoecus*, but the legs in that genus are conspicuously more elongate than in the present insect and the terminal palpal segment is cleft only apically in dried material, in the present insect that segment being cleft on the apical three-fourths, as in all the species of *Ceuthophilus*.

The collector's notes on the specimens comprising this species are as follows:

11230. "Young cricket taken from a point beyond the Devils Sink Hole in absolute darkness. April 23." (A male nymph, probably first stage.)

11239. This number covered both the above described species and is entered under the first, which see.

11242. "April 24, '24. Pale cricket taken midway between 1st and 2d shaft. Cricket quite active." (One adult female.)

11508. "April 23, 1924. Crickets collected in Carlsbad cavern between west opening and west shaft." (Two adult pairs.)

11511. "April 23, 1924. Crickets collected from walls and floor of King's Palace. This is the furthest and darkest point where insect life was found." (Two females, one an adult and one a half grown nymph.)

Regarding the habits of the above described crickets Mr. Bailey writes that they are abundant throughout the cave, even to the furthest corners miles from any trace of light. They were usually crawling along on the floor or hidden beneath rocks, or in crevices, etc. The very long antennae were always extending out ahead when the insects moved. They ate scraps of discarded luncheons, fresh meat placed as bait for other insects and rolled oats used as bait for mice.

CHANGE OF NAME (HYMENOPTERA).

By R. A. Cushman, *U. S. Bureau of Entomology.*

I find that my *Ephialtes* (*Itoplectis*) *pacificus* is preoccupied by *Ephialtes pacificus* Harrington, and therefore rename it *Ephialtes* (*Itoplectis*) *esuchus*, new name.

THE IDENTITY OF NEMICROMELUS FULVIPES (FORBES), A COMMON HESSIAN FLY PARASITE (HYMENOPTERA).

By P. R. Myers, *U. S. Bureau of Entomology.*

The following information on this chalcidoid parasite is submitted for publication in order permanently to fix, if possible, the identity of this common Hessian fly parasite. It frequently has been referred to in literature under two specific names which at various times have been placed in six different genera.

The author hereby acknowledges his indebtedness to Dr. S. A. Forbes for information which made it possible definitely to fix the specific synonymy. The author's thanks are also due Mr. A. B. Gahan for useful information and helpful criticisms of which he has availed himself in the preparation of this paper.

Family PTEROMALIDAE.

Nemicromelus fulvipes (Forbes).

Pteromalus ? fulvipes Forbes, 14th Rept. State Ent. Ill (1884) 1885, p. 47–48.

Pteromalus fulvipes Packard, Amer. Nat., vol. 19, 1885, p. 1105.

Merisus fulvipes Cresson, Syn. Hym. N. A., 1887, p. 242.—Dalla Torre, Cat. Hym., vol. 5, 1898, p. 90.—Smith, Ins. N. J. (1909) 1910, p. 642.

Merisus (Homoporus) subapterus Riley, Proc. U. S. N. M. vol. 8, 1885, pp. 416–417, pl. xxi, fig. 2.—Packard, Amer. Nat., vol. 19, 1885, p. 1104.—Riley, Proc. Amer. Assoc. Adv. Sci. (1885), vol. 34, 1886, pp. 332–334.

Merisus subapterus Lindemann, Bull. Soc. Imp. Nat. Moscou (2) I, 1887, p. 178–192.—Cresson, Syn. Hym. N. A., 1887, p. 242.—Viereck, Conn. Geol. and Nat. Hist. Sur. Bull. 22, 1916, p. 480.

Baeotomus subapterus Marchal, Ann. Soc. Ent. Fr., vol. 66, 1897, p. 81.—Osborn, U. S. D. A., Div. Ent., n. s. Bull. 16, 1898, pp. 28, 32.—Felt, 17th Rept. N. Y. State Ent., Bull. St. Mus. 53, 1902 p. 721, fig. 3.—Webster, U. S. D. A. Bur. Ent. Cir. 70, 1906, pp. 12–13.—Felt, 28th Rept. N. Y. State Ent., 1913, p. 40.—Webster, U. S. Farmers' Bull. 640, 1915, pp. 16, 20, fig. 17.

Homoporus subapterus Dalla Torre, Cat. Hym., vol. 5, 1898, p. 91.—Smith, Ins. N. J. (1909) 1910, p. 642.

Micromelus subapterus Ashmead in Smith's Ins. N. J., 1900, p. 558.—Kurdiumov Entom. Viestnik, vol. 2, no. 1, 1913, pp. 1–4.—Fyles, Ont. Ent. Soc. Rept. No. 46, 1916, p. 56.—Packard, C. M., Jour. Agr. Res., vol. 6, 1916, pp. 367, 377–381.—McColloch, Kans. Exp. Sta. Tech. Bull. 11, 1924, pp. 63–72.

Nemicromelus subapterus Girault, Descriptiones Hymenopterorum Chalcidoidicarum Variorum cum Observationibus, V, Aug. 8, 1917, p. 4.

In 1885, Dr. C. V. Riley described a species of Hessian fly parasite under the name *Merisus (Homoporus) subapterus*. During this same year Dr. S. A. Forbes also published a description of a Hessian fly parasite under the name *Pteromalus* (?) *fulvipes*. Both of these descriptions were found later to apply to the same species and accordingly Cresson listed the two names separately under *Merisus* but indicated they were

synonymous although he did not state which name had priority. Dalla Torre listed the species as *Merisus fulvipes* and also as *Homoporus subapterus*, the latter with *Pteromalus fulvipes* cited as a synonym. Marchal, Osborn, and other authors later referred to the species as *Baeotomus subapterus*. Ashmead placed it in *Micromelus* Walker and Kurdiumov, Fyles, C. M. Packard and McColloch have followed Ashmead. In 1917, Girault erected the genus *Nemicromelus* and cited *Merisus subapterus* Riley as the genotype which he said equaled *fulvipes*.

Recently, in the course of the preparation of a paper on the parasites of the Hessian fly, the question arose as to which should be the proper specific name for this species, *subapterus* or *fulvipes*.

The author realizing that the correct specific name for this parasite depended upon the actual dates of the publication of the descriptions of *Pteromalus fulvipes* and *Merisus subapterus* within the year 1885, wrote to Mr. A. B. Gahan of the Bureau of Entomology, in order to learn, if possible, the actual dates of their publication. To this letter Mr. Gahan replied as follows:

"The question of priority as between *fulvipes* (Forbes) and *subapterus* (Riley) is not an easy one to answer. Riley's species was described in Proc. U. S. N. M., Vol. 8, p. 416, 1885, and the actual date of publication of this part of the volume was October 3, 1885. The description of *fulvipes* (Forbes) appears in the fourteenth Report of the State Entomologist of Illinois, p. 47. This report is for the year 1884, but was published in 1885, and I am unable to determine the exact date of publication. I find that both papers were reviewed in the American Naturalist, Vol. 19, November, 1885, p. 1104. This review is the only one that I can find which gives any key to the time of appearance of Forbes's paper. It appears, however, that Osborn and Dalla Torre, and perhaps others, have listed *fulvipes* as a synonym of *subapterus*. Perhaps they had definite information as to which name was earlier. If you find any information which will establish definitely which name was first published, I should be glad to be made acquainted with it."

Upon receipt of this reply which did not fully satisfy the author, he wrote to Dr. Forbes, inquiring the actual date of his description of *Pteromalus fulvipes*. Dr. Forbes replied as follows:

"I have looked through my office letter files for 1885 and find definite evidence as to the date of publication of my 3d report, the 14th of the State Entomologist's Office.

"The earliest acknowledgments which I find of receipt of copies are from G. H. French of Carbondale, Illinois, September 2, 1885; F. M. Webster, then at Purdue University, September 3d; Professor N. H. Winchell of Minneapolis. Minnesota, September 11th; Dr. J. A. Lintner, Albany, N. Y., September 14th, all antedating Riley's paper which bears the publication dates of September 14th and 17th for parts one and two respectively.

"I find also under date of September 16th a request for the 13th and 14th reports of the State Entomologist's Office from the State Library of Massachusetts, showing that a knowledge of the appearance of the 14th report had begun to become general by that date.

"I am enclosing these letters, which you will kindly return when you have verified their dates."

Upon the receipt of this interesting and valuable information the writer submitted his evidence to Mr. Gahan, in response to which he replied as follows:

"Your registered letter of March 1 received, and I was very glad to see the interesting correspondence sent by Dr. Forbes. The evidence he submits seems to be very conclusive that the description of *Pteromalus fulvipes* Forbes antedates the description of *Merisus subapterus* Riley. This being the case, of course *fulvipes* is the specific name which should be used."

"P. S.: Although the dates printed on the signatures in which Riley's description of *subapterus* appeared are Sept. 14th and 17th as Forbes states, the records in the office of Correspondence and Documents of the U. S. National Museum indicate that the papers were not received from the Government Printing Office until Oct. 3. A. B. G."

Although the author regrets to see the name *subapterus*, which is so applicable to the species, give way to the name *fulvipes*, yet the change must be made, if the rule of priority is to be strictly adhered to, and credit given the one to whom it rightly belongs.

In view of the fact that Girault erected the genus *Nemicromelus* citing *Merisus subapterus* Riley as the genotype which has now proven to be a synonym of *Pteromalus fulvipes* Forbes, the proper name to be applied to this common species of Hessian fly parasite is *Nemicromelus fulvipes* (Forbes).

THE SYSTEMATIC POSITION OF THE GENUS HARMOLITA MOTSCHULSKY WITH ADDITIONAL NOTES (HYMENOPTERA).

By A. B. Gahan, *U. S. Bureau of Entomology.*

Messrs. W. J. Phillips and W. T. Emery in 1919[1] published a "Revision of the Chalcid-Flies of the Genus *Harmolita* of America North of Mexico." Largely upon the advice of Mr. J. C. Crawford and the writer, the authors used the generic name *Harmolita* Motschulsky for this group of insects which constitutes the well known jointworms of grasses and grains previously going under the generic name *Isosoma* Walker. The name *Isosoma* was shown to be preoccupied, having been used by Billberg (1820) in Coleoptera. Dr. Ashmead, in his "Classification of the Chalcid Flies," had pointed out that Mot-

[1]Proc. U. S. Nat. Mus. vol. 55, 1919, p. 443–471.

schulsky's genus was the same as Walker's. Being the oldest synonym it should therefore take the place of *Isosoma* Walker.

In 1920,[1] Dr. R. Hedicke, a German writer, published a contribution toward a monograph of the Palearctic Isosomini in which he treats the species under the Walkerian name, *Isosoma*, but in a supplemental statement at the end of the work, having seen Phillip's and Emery's paper in the meantime, he recognizes the preoccupation and invalidity of *Isosoma* Walker but refuses to accept *Harmolita* Motschulsky as a substitute and proposes a new name, *Isthmosoma*, to replace *Isosoma* Walker.

Hedicke's reasons for refusing to accept *Harmolita* seem to have been that Motschulsky placed his genus in the family *Pteromalidae* instead of *Eurytomidae* and since Motschulsky, in the same paper, described new Eurytomids, thus showing that he knew the differences between *Pteromalidae* and *Eurytomidae*, it followed that *Harmolita* could not be a Eurytomid and hence was not the same as *Isosoma* Walker. This sounds rather logical but unfortunately science and logic do not always agree. One has but to notice the genera which Motschulsky placed in his various subfamily groups to realize that his ideas of relationship were somewhat vague. In his group *Chalcidides* we find *Chalcis*, *Brachymeria*, *Eurytoma*, *Decatoma* and *Eucharis;* in his *Thorymides* are *Callimome*, *Marietta* and *Roptrocerus;* while in his *Pteromalides* we find *Cheiloneurus*, *Encyrtus*, *Anastatus*, *Harmolita*, *Pteromalus*, *Eulophus*, *Cirrospilus*, and *Tetrastichus*. One can hardly argue from this that Motschulsky was infallible as a classifier of *Chalcidoidea*.

Upon receipt of Hedicke's paper Mr. Phillips wrote me asking my opinion as to Hedicke's conclusion. After again looking up the original description I wrote Phillips stating that in my opinion Hedicke was wrong; that Motschulsky's figure and description indicated very clearly to me that the genotype species had nothing to do with *Pteromalidae* and so far as I could see left little doubt that Ashmead was right in considering the species congeneric with *Isosoma* Wlk. I stated that the figure is nothing more than a poor habitus sketch but the shape is exactly that of a male *Isosoma* and the description, although not very complete, tallies with *Isosoma*. I stated further that Hedicke's conclusion seemed to me to have been drawn without having seen the description; that he could very well have reasoned as he did from a consultation of Dalla Torre's catalogue but had he consulted the description of *Harmolita*, I did not see how he could have said what he did and that in my opinion *Harmolita* should stand as Phillips and Emery had used it while *Isthmosoma* Hedicke should be considered a synonym.

Very unexpectedly to me and quite unfortunately the contents of my letter were communicated to Hedicke. Quite

[1]Archiv. f. Naturg. Jahrg. 86A, 11, p. 165.

naturally it did not meet with his whole-hearted approval. On the contrary there appeared in Deutsch Entomologische Zeitung, 1923, pp. 616–618, an article by Hedicke entitled "Der systematische Stellung des Genus *Harmolita* Motschulsky 1863" in which the author quotes largely from my letter to Phillips and emphatically reaffirms his opinion that *Harmolita* Motschulsky and *Isosoma* Walker are not the same and *Isthmosoma* should stand.

In this paper, Hedicke reviews his previously given reasons for believing *Harmolita* could not be a Eurytomid but in addition cites certain statements in the original description which according to his interpretation exclude it from the *Eurytomidae*. He points out particularly the shape of the pronotum and mesonotum which Motschulsky describes as follows: "pronotum coniquement atténué en avant, obliquement imprimé de chaque côté à angles antérieurs un peu saillants; mésonotum en triangle allongé." Hedicke states that this thoracic structure excludes *Harmolita* from the Eurytomines. On the contrary when interpreted in the light of Motschulsky's figure the description agrees very well with almost any species of the joint worm flies if one will simply assume that what was meant by mesonotum was the middle lobe of the mesonotum which is always prominent and distinctly triangular in this group. Hedicke also calls attention to Motschulsky's statement that the "veine costale atteignant le côté lateral un peu au delà du milieu de l'aile" and states that this too is never true of Eurytomines. The writer is prompt to admit that this character if correctly stated by Motschulsky is unusual for the Eurytomines but I believe not more unusual than it would be for the Pteromalines. Although unusual, it is not impossible even for the Eurytomines as may be shown by a male specimen of (*Isosoma*) *Harmolita bromi* How. in the national collection. In this individual the wings are a little shorter than usual and the costal vein attains the margin a little beyond the middle of the wing. In my opinion therefore the characters cited by Hedicke do not exclude *Harmolita* from the *Eurytomidae*.

On the other hand there are certain characters given by Motschulsky which in my opinion make it practically certain that *Harmolita longicornis*, the genotype species, is one of the joint-worm flies. The description of the antennae fits exactly that of a male *Isosoma* if it be admitted that Motschulsky overlooked the ring-joints. The description of the head and thorax if taken with the figure agrees with a male joint worm fly as does the shape of the abdomen and the distinct abdominal petiole. The thing above all others, however, which establishes beyond a reasonable doubt that *Harmolita longicornis* is identical with *Isosoma* of Walker and authors is the fact that the insect is black throughout with the exception that the anterior angles

of the pronotum are testaceous. I know of no other group of the Chalcidoidea in which this peculiar combination of color is found and in the joint worms it is the rule rather than the exception.

Perhaps the only way in which the identity of *Harmolita* can be established beyond a doubt will be for some one to examine the type specimen if this is still in existence. In the meantime it is my intention to continue to use *Harmolita* in place of *Isosoma* Walker.

In conclusion I must call Dr. Hedicke's attention to the fact that in attempting to correct the reference to the original description of *Harmolita* given by Gahan and Fagan in their genotype list of the Chalcidoidea,[1] which is admittedly wrong as to the year and which he makes the basis for the suggestion that one might suspect that the authors had not seen Motschulsky's diagnosis, he has himself committed a more serious error by citing the wrong volume, the correct citation being Bull. Soc. Nat. Moscow, vol. 36, pt. 2, 1863, p. 58 instead of vol. 35.

Very recently I received from Mr. T. Ishii of the Imperial Plant Quarantine Station at Nagasaki, Japan, specimens of two phytophagous species of Eurytomidae which proved of unusual interest. As the locality record is new for both species and the host plant record new for one it is worth while to make a note of them at this time.

Harmolita phyllostachitis Gahan.

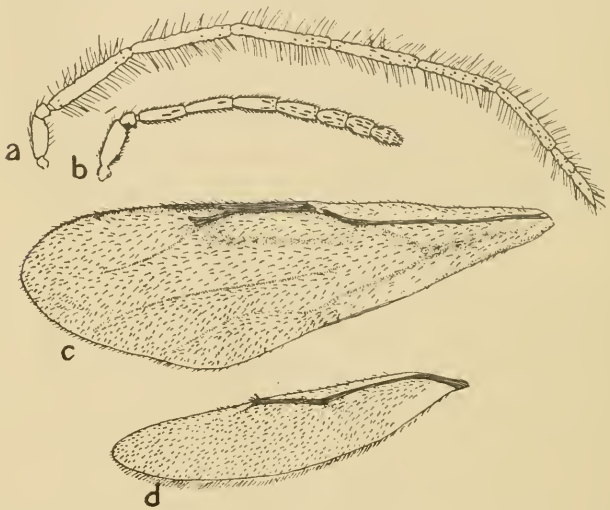
In 1922 (Proc. Ent. Soc. Wash. vol. 24, p. 55) the writer described *Harmolita phyllostachitis* from Brooksville, Florida, where according to records of the Department of Agriculture it was attacking and proving more or less seriously injurious to young shoots of bamboo (*Phyllostachys bambusoides*). At that time it was impossible to tell whether the species was a foreign importation which had become accidentally established in Florida or a native species which had recently taken up the habit of attacking bamboo. It was considered more likely that its presence in Florida was due to accidental importation but this could not be proven.

In the Ishii sending was a single female which he had tentatively determined as *H. phyllostachitis* and upon comparing it with the types I have no hesitancy in pronouncing it that species. The presence of the species in Japan indicates that country as the possible original source of the Florida infestation. At any rate *phyllostachitis* is certainly not a native of Florida. In all probability its original home was in China or Japan and it was established in Florida through the importation of infested bamboo cuttings for propagation.

[1]Bull. 124 U. S. Nat. Mus., 1921, p. 69.

Aiolomorphus rhopaloides Walker.

This genus and species described by Walker in 1871 (Notes on Chalcid. pt. 1, p. 12) from a male specimen collected in the region of Hong Kong, China, apparently has not been mentioned in the literature since, except in catalogs. In the Ishii sending were two specimens, a male and a female, which my correspondent suggested seemed to be quite identical with Walker's species and after comparing the specimens with the description I am convinced that they are in fact that species. Mr. Ishii states that the species attacks the shoots of bamboo (*Phyllostachys bambusoides* and *P. mitis*) and is quite common in Japan. The national collection contains an additional female specimen taken at quarantine in Washington, D. C., January 25, 1923, from a box containing bamboo cuttings received by the Department of Agriculture from Nishighara, Japan.



Aiolomorphus rhopaloides Walker; a, antenna of male; b, antenna of female; c, forewing; d, posterior wing.

Aiolomorphus rhopaloides Walker is a close relative of some species of the genus *Harmolita* Motschulsky (the common jointworms of grains and grasses). It is remarkable for the presence of vestigial basal, median, radial, and other veins in the forewing (see fig. 1.). It differs from *Harmolita* also in having the parapsidal grooves deeply impressed anteriorly but entirely effaced on the posterior one-third of the mesoscutum, and in having in the female a 6-jointed funicle with a very short 3-jointed club. The abdomen of the female is more strongly

compressed from the sides than in most species of *Harmolita* and the fourth tergite is the largest. The male has unusually long antennae, these being very nearly as long as the whole body, 10-jointed with one ring joint, the first flagellar joint fully twice as long as the scape, following joints subequal to the first, the two apical ones very slightly shorter. The head and thorax in both sexes are rather coarsely shagreened with some indistinct umbilicate punctures, the face with convergent striae.

ON THE SYSTEMATIC POSITION OF THE GENERA COLLYRIA SCHIÖDTE AND ISCHNOCEROS GRAVENHORST (HYMENOPTERA).

By R. A. Cushman, *U. S. Bureau of Entomology.*

In a paper on the "Holarctic Tribes of the Ichneumon-flies of the Subfamily Ichneumononinae (Pimplinae)"[1] Cushman and Rohwer eliminated the genus *Collyria* Schiödte from the subfamily Ichneumoninae and expressed the opinion that it should form a distinct subtribe in the tribe Mesoleptini, subfamily Tryphoninae. Further critical study of the genus, however, indicates that this conclusion is wrong and that the genus should more properly be restored to the Ichneumoninae.

In the tribal keys of Cushman and Rohwer, both in that based on females and in the general key, *Collyria* runs best to the tribe Odontomerini. In several of the key characters it resembles the Labenini: the form of the propodeum and first abdominal segment and the position of the insertion of the latter on the propodeum and the form of the hind coxae; but otherwise apparently has little in common with that tribe. The Odontomerini, on the other hand, it resembles in the swollen head with the eyes nonemarginate and distant from the mandibles, in the strong notauli, in the lack of the areolet and in the venation of the wings generally, in the stout hind femora, and somewhat in the form of the abdomen beyond the first segment.

But, in addition to the characters by which it resembles the Labenini, it differs from the Odontomerini in the incompletely areolated and mutic propodeum, the normal tibiae in the female, the form of the ovipositor, and the hairy eyes.

Were *Collyria* to be included in the Odontomerini it would destroy the homogeneity that characterizes that group; and I believe that the best disposition to be made of it is to erect a new tribe for its sole reception.

Tribe Collyriini, new tribe.

The keys of Cushman and Rohwer cited above will have to be modified as follows for the inclusion of this tribe. Under the

[1]Proc. U. S. Nat. Mus., vol. 57, 1920, p. 395.

second alternate of couplet 12 in the key to females insert the following couplet:

Propodeum completely areolated, the carinae, except sometimes the median, distinct, upper angles mucronate; middle tibiae stout and twisted; hind coxae short and thick; first abdominal segment arched above and strongly widened toward apex; eyes not hairy; ovipositor very long, slender, serrate at apex ..... *Odontomerini.*

Propodeum incompletely and very faintly areolated, upper angles mutic and not at all defined; middle tibiae normal, slender; hind coxae very long and slender; first abdominal segment straight above and only slightly widened toward apex; eyes hairy; ovipositor short, rather deep, rather abruptly smaller near apex ..... *Collyriini*, new tribe.

Under the first alternate of couplet 5 in the general key to tribes the following couplet should be inserted:

Propodeum completely areolated, the carinae, except sometimes the median, distinct, upper angles mucronate; eyes not hairy ..... *Odontomerini.*

Propodeum incompletely and very faintly areolated, upper angles mutic and not at all defined; eyes hairy ..... *Collyriini.*

Tribal characters.—Head large, swollen, temples broad, slightly sloping, their antero-posterior length nearly as long as that of eye; occiput concave, the carina distinct and complete; eyes rather small, distant from mandibles, beset with short hairs; clypeus separated, medially dentate; mandibles subequally bidentate; antennae slender, stouter beyond middle; thorax long, the propodeum very long and straight above from base to insertion of abdomen, which is above the hind coxae, only the longitudinal carinae present, these weak or obsolete, spiracles elongate oval, far from base; notauli deep; scutellum convex; areolet wanting; nervellus broken far above middle; legs long, rather slender except the rather stout hind femur, hind coxa very long, the femur short, claws falcate, neither pectinate nor dentate; abdomen in female elongate fusiform acute at apex, in male sublinear, first tergite straight, depressed, petiolate, slightly widening from base to apex, spiracles before middle; hypopygium far before apex of abdomen; ovipositor short, compressed, in profile rather suddenly smaller just before apex.

The typical and only included genus is *Collyria* Schiödte.

Genus **COLLYRIA** Schiödte.

Collyria Schiödte, Magas. de Zool., vol. 9, 1839, pp. 6–10, note.
Pachymerus Grav., Ichn. Eur., vol. 3, 1829, p. 721 (not Lepeletier).

Description.—The characters of the tribe.

Distribution.—Dalla Torre's "Catalogus Hymenopterorum" lists nine species. All but one of these are old world species. The one exception is *Collyria nigrolineata* Brullé of Guiana, which Krieger[1] has transferred to *Eiphosoma* and Morley[2] has synonymized with *Eiphosoma mexicana* Cress.

[1]Zeits. Hym.-Dip., 1903, p. 291.
[2]Rev. Ichn. B. M., pt. 2, 1913, p. 54.

Tribe Odontomerini Cushman and Rohwer.

Genus **ISCHNOCEROS** Gravenhorst.

Ischnoceros Grav., Ichn. Eur., vol. 2, 1829, p. 949.
Mitroboris Hlmgn., Oefoers. Svensk. Vet.-Akad. Förh., vol. 16, 1859, p. 131.

Cushman and Rohwer (loc. cit.) did not know and failed to mention this genus in their reclassification of the Ichneumoninae. Since that time two specimens have come to the National Museum with the collection of the late Theodore Pergande. These are determined by Schmiedeknecht as *Ischnoceros cornuta* Ratz. Both run in Schmiedeknecht's key[1] to *filicornis* Kriechb., with which Schmiedeknecht synonymizes in part *Mitroboris cornuta* Ratz.

On the basis of these specimens it is perfectly obvious that the genus belongs to Odontomerini, being practically an *Odontomerus* without femoral teeth and with a frontal horn.

No American species are known.

SYNONYMICAL NOTES ON TWO SPECIES OF AULACASPIS (HEMIPTERA: COCCIDAE).

By Harold Morrison, *U. S. Bureau of Entomology.*

Exactly thirty years ago Prof. T. D. A. Cockerell (1)[2] described as a new species from the West Indies the diaspine scale insect *Chionaspis major*. This insect, after being referred to in literature by its describer and some others a few times, apparently dropped completely out of sight. Much more recently, Rutherford (2) described as new the species *Aulacaspis flacourtiae* from Ceylon, and this species was later redescribed and figured by Green and Laing (3). Mr. Green has subsequently very kindly verified the writer's identification of certain specimens from Cuba as being identical with Rutherford's species, and has furnished him with examples of it. Recently, while attempting to determine the identity of certain specimens collected by the Federal Horticultural Board, the writer became aware of the close resemblance in the pygidial characters of these two species, supposedly belonging to different genera, and on following up the initial examination by a comparative study of the material available, including type specimens of *Chionaspis major* Ckll., was forced to the conclusion that the two are identical. The insect, as was pointed out by Green and Laing in the paper cited, closely resembles the West Indian Peach Scale, *Aulacaspis pentagona* (Targ.), and this resemblance also exists in the scale,

[1]Opusc. Ichn. vol. 3, p. 1347.

[2]Numbers in parentheses refer to literature cited at end of paper.

this not differing evidently, except in larger average size, from that of *pentagona* as this grows under some conditions.

The generic assignment and synonomy of this species will, for the present, stand as follows:

Aulacaspis major (Cockerell).

Synonym.—Aulacaspis flacourtiae Rutherford.

Distribution and Host Relationships.—Published records include Antigua, B. W. I., on Heliotrope; Ceylon, on *Flacourtia ramontchii;* Seychelles, on *Flacourtia.* Material in the National Collection of Coccidae includes the types, the Seychelles record, specimens from Hawaii on Litchi, collected by H. Y. Gouldman (F. H. B. No. 26945) and on *Nephelium longanum*, collected by Jacob Kotinsky; from Buitenzorg, Java, on *Ficus* sp., collected by R. S. Woglum; from Hong-Kong, China, on unknown plant, collected by Geo. Compere; from Costa Rica, on Pejibayes fruit, collected by H. Y. Gouldman (F. H. B. No. 43985); and from Oriente Province, Cuba, on *Cupania macrophylla*, collected by C. H. Ballou.

The close relationship of this species to *A. pentagona* suggests that it might develop into a pest of some importance if it became established in the subtropical regions of the United States.

The transfer of Cockerell's name *major* to the genus *Aulacaspis* creates a situation which is unfortunate, but which apparently can not be avoided. Since this transfer makes *Aulacaspis major* Rutherford (4), described from New Guinea on sugar cane, a homonym of Cockerell's older species, it becomes necessary to propose a new name for it, although such a change might not be necessary if the generic classification of the group to which these species belong had been properly worked out.

The writer therefore proposes the combination *Aulacaspis rutherfordi* as a new name for the species described as *Aulacaspis major* Rutherford.

LITERATURE CITED.

(1) Cockerell, T. D. A.—Ent. News, v. 5, 1894, p. 43.
(2) Rutherford, A.—Bull. Ent. Res., v. 5, pt. 3, 1914, p. 259.
(3) Green, E. E. and Laing, F.—Bull. Ent. Res., v. 12, pt. 2, 1921, p. 128.
(4) Rutherford, A.—Proc. Linn. Soc. N. S. Wales, v. 41, 1916, p. 215.

Actual date of publication, December 24, 1924.

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It seems a far cry from Systematic Entomology to the ancient craft guilds. Yet from them Entomologists can learn a great lesson, in their methods find precedent for the solution of some very pressing present problems. (The implication is of course much broader, covering practically the whole field of scientific research; but that need not concern us here.)

The guilds were close self-governing corporations which allowed the freest play to individual talent and initiative and at the same time subordinated individualism to a cooperative ideal. They were also educational bodies, conserving and perpetuating an entail of culture. By a rigidly enforced system of apprenticeship, which brought master and pupil into closest intimacy and made them copartners in experience, they ensured a continuity of effort and a progressive evolution in technique from generation to generation. Every artisan was at once craftsman and teacher. As craftsman he was a freely cooperating unit in an organic social body. As teacher he was a link in an unbroken chain of tradition.

Here is something for the systematist to ponder. Science more than art depends upon continuity of effort, more than art demands a transmitted technique. What are we doing to ensure them in our specialty? Much, admittedly. Under the aegis of Economic Entomology our activities are being more and more coordinated and directed to humanitarian and practical ends. We are cooperating more with other scientific workers. The essential place of the systematist in the scheme of things is being more and more appreciated. All of which tends to bring us closer to the achievement of a real corporate organization. (It is to be hoped that this can be effected without the sterilizing blight of bureaucracy.) So far we approach the guild ideal. But we have almost entirely neglected the educational factor. We have made no provision for apprentices. Young men come from the schools with more or less of a grounding in theory, plunge into special problems and thereafter go on their own, learning only from their own successes or failures and buying experience at an exhorbitant cost of time and labor. The result is a diffusion of energy, a lack of continuity in systematic study or technique. The systematists have successors; but it is only in very rare instances that they have heirs—younger men who have studied with them, shared in and profited by their experience and been equipped to carry on and enlarge upon their work. This is something that can and should be corrected. The problem demands more consideration than we can give it here; but it seems pertinent at this time, upon the eve of a great scientific congress, that the need be at least stated and the good precedent invoked.

—*Carl Heinrich.*

The Lepidoptera of New York and Neighboring States (Primitive Forms, Microlepidoptera, Pyraloids, Bombyces).—Forbes, William T. M., Cornell University Agr. Exp. Sta., Memoir 68, June, 1923, 729 pp., Illustrated, Ithaca, New York, Dec., 1924.

The above is a handbook of the Lepidoptera of the Northeastern United States and Eastern Canada. It covers about half the species of that littoral (excluding the Geometroidea, Sphingoidea, Noctuoidea and Rhopalocera, which are reserved for a later volume). After a brief introduction stating the author's views on Taxonomy, Variations, Relationships, and Distribution, there is a chapter on the structural characters of the adult, pupal and larval stages, a descriptive synopsis of the various families and family keys to the imagines, larvae and pupae (the synopsis and keys including the families not treated in the manuel). The families, genera and species are then treated in detail, with keys, descriptions and life history notes. There are numerous text figures of structural characters and the work closes with a food plant index to the species and a name index.

It is a noteworthy and in many respects a pioneer work; for it is the first Handbook of American Lepidoptera and the first large scale work of any kind which has attempted a classification of the order upon a combination of larval, pupal and adult characters. It lacks the symmetry and simplicity of Meyrick's famous Handbook of the British Lepidoptera, and the student will not find it as easy to use. The keys, however, are workable and the classification on the whole (though one could quarrel with it in some details) is apparently a natural one.

Some faults must be noted. In a few instances (the genus *Isophrictis* and the species *Petrora virginiana* and *P. albicapitana*, for example) names have been credited to the wrong authors. A couple of manuscript generic names have crept in, one of which (*Charlotta*) adds a useless synonym to our list. The author has also increased our already over-abundant supply of barbarisms by validating a couple of Kearfott's unpublished nonsense names. The lack of a bibliography is regrettable. In such a work specific or generic references are unnecessary and the author was justified in omitting them; but he might well have given the titles (either in foot notes or at the end of the volume) to the few comprehensive papers dealing with families or large groups, and thereby greatly increased the reference value of the book. These, however, are only minor blemishes in an otherwise fine work. Dr. Forbes is to be congratulated upon his brilliant achievement. The book is a distinct contribution to knowledge and will be useful to every Lepidopterist and indispensable to the student.

—*Carl Heinrich.*

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