

The Canadian Entomologist.

VOL. XLVIII.

LONDON, APRIL, 1916

No. 4

POPULAR AND PRACTICAL ENTOMOLOGY.

THE FIVE THOUSAND DOLLAR BUTTERFLY.

BY R. P. DOW, BROOKLYN, N. Y.

Somewhat over eight centuries have elapsed since the men of Europe woke from the slumber of the Dark Ages and began to value mental culture. Men of classic times do not appear to have been "collectors" except of art works. In the Renaissance there was a turn to Natural History, possibly inspired by the Moors, who taught even Entomology in their universities. Too many of the new collectors looked for unicorns, nine-headed hydras, and the like, but there was nothing more popular than a display of butterflies. The first collection of the "Frail Children of the Air" which is now known was made by an Italian toward the end of the Eleventh Century. From that time the number of Entomologists increased amazingly, although not until about A.D. 1600 was any truly scientific work done. However, it is much the same to-day. There is a goodly representation in every Entomological Society of students, of close observers, even of patient taxonomists, but the majority are still mere collectors, desiring nothing more from their fellows than the scientific names of their specimens and using no more mental acumen than is necessary to get together postage stamps or tin tobacco tags.

If a man will collect, spread and value butterflies in his cabinet, it also follows that he will buy them. He wishes for two elements, beauty and rarity. Thus the professional collector came into existence. He found business most lucrative furthest afield, in the most inaccessible corners of the earth, but he found much, too, at home. For at least a century there has existed a widespread belief that somewhere, anywhere, perhaps in one's own backyard, anyone might find a rare butterfly, so rare that some collector somewhere would gladly pay \$5,000 for the prize. It has passed orally through many lands, occasionally getting into print, but

not often, for publicity and superstition are not compatible companions. To-day in this country there are thousands of people who, if they spy a butterfly unfamiliar to them, hasten to learn if it be not the precious prize. Scarcely a year ago a newspaper printed an account of a butterfly caught near New York which was unique and for which \$3,000 was paid at once by the nearest Museum. Such items and such inquirers have become the bane of every Museum Curator's existence. Such hordes of *Pieris rapæ* or *Anosia plexippus* come in the mails, each inquiry demanding an answer! A little less than twenty years ago a prominent newspaper was guilty of printing a more startling variant of the myth. It was to the effect that the United States National Museum had just paid \$20,000 for an American butterfly. An employee was forced to devote several months of his entire working days to writing denials and pacifying visitors who came with specimens worth less than a penny for which they hoped to get thousands.

A similar myth which has got into print scores of times is that of the arctic flea. It differs much in detail. The price that it would fetch (a pair being wanted) was sometimes as low as \$1,000, but it was more often up to the traditional \$5,000. It was invariably wanted by the Hon. Mr. Rothschild. Some said the creature inhabited the fur of the arctic fox. Others cited the sea otter and called it the more elusive, as at the moment the animal was killed the parasite left the body. It is said that Mr. Rothschild has sent expeditions at the cost of tens of thousands to hunt arctic mammals until the identity of the desired flea should be forever established and the types deposited in the Tring Museum.

It is quite possible that some good-natured student of fleas would give five dollars for some new arctic species.

All this suggests two lines of inquiry: Has \$5,000 ever been paid for a single entomological specimen; if not, how much has? On the other hand, is it possible for any one in North America, excepting less than a dozen trained experts, to make even a moderate living by collecting insect rarities? Any dealer in insects might be inclined through self-interest to exaggerate the first, since he has rarities to sell, and to under-estimate the other, since he is constantly importuned to buy.

No doubt, big prices have been paid, especially long ago when travel was not so easy as it is now. A very interesting tale is that of the first collector who landed in the Solomon Islands and lived six weeks in the tree tops to avoid the head hunters. We hope his grist fetched a big price and that for his glorious new green and gold *Ornithoptera* a sum in four figures was given. We know that the first *Drurya antimachus* (or perhaps it was not even the type) was bought by a Scotchman for \$1,500, but we do not know how much of this went to the explorer who braved the malarial jungle. For a Brooklyn collection \$2,000 was once paid, there being little of value except the singleton *Actias Jehovah*, eccentrically named by Strecker. An aberrant *Papilio* was once sought from Mr. Neumogen by a Russian Prince for \$1,000, but its like can now be bought from a dealer for \$25. Girdling the world is making it smaller. Mr. Say received \$300 for his *Amblychila cylindriciformis*. It was thirty years before a second specimen was unearthed. That fetched \$50. To-day fifty cents is a fair price. Not many years ago a collector in New Jersey had in his boxes two aberrants of common *Papilio*. A dealer gave him \$25 for both and resold them for about \$300 each. The first three specimens of *Sphinx frankii*, caught not so many years ago, averaged nearly \$300 apiece. Such instances can be multiplied many times.

As for making a living by collecting, a few exceptions prove the rule of its futility. An enterprising young woman in the far west, taught by her father, a veteran collector, caught both place and psychological moment. She sold her season's catch from an untraveled mountain pass for a price which sent her through college. But how many others could get a tenth as much? Could any half-trained collector get a cent a piece for a season's catch, unless from some very remote place? A collector well trained in beetle study, whose home territory is in the mountains seldom traveled, writes to me that with constant labour he can hardly average \$5 a week.

A favorite way of collecting is to get "grubstaked." Some naturalist wants to visit some rare locality and collects funds from his friends, each contributor to take pay in "results," one taking beetles, another Orthoptera, etc. Of a score of such trips

taken or planned during the last five years I do not recall one that was successful. During three years of editorship I have received probably a thousand letters of which a sample is: "I have sixteen *cecropia* cocoons, two *Luna*; three *Promethea*, and one *Polyphemus*. What can I get for them?" What can one reply when he gives away each year several bushels of them for school study?

Even the practice of "exchanging" seems to be in decay. One reason for this is, no doubt, due to the lack of idea of fairness in giving value for value. Another is that the Lepidoptera have been so well distributed that there is little left to exchange. A while ago a selection of four hundred names was taken from the Naturalists' Directory, all marked as desiring to exchange in some province. All these were written to. A dozen replies were received, mostly to say that no more interest was taken. Not one was inclined to start exchanges on any basis whatever. In a Pacific Coast city, where Natural History has lately received a great impetus, there are sixty lads frequenting a newly established Museum, who have written broadcast, wanting to give their local butterflies in exchange for those of any other part of North America, I doubt if between them all they have received ten letters of encouragement.

Is there no pleasant side to the story? Do not some make money? Yes, many. A farmer in California allows the Dutchman's Pipe to grow in some of his fence corners. He takes enough chrysalids of *Papilio philenor* to pay the annual taxes on the whole farm. An assistant janitor of a big building in Brooklyn loves his Sunday afternoon walk in the country. One day he gathered 50,000 hibernating squashbugs (*Anasa tristis*) and sold them. He cleared \$90 in twenty walks and had lots of fun besides. One day a party of us were on Rockaway Beach when *Anosia plexippus* was swarming on the way south. They were numb with cold and easy to pick as blackberries. A day's work would have included less than, say, 20,000 of them, and they found a ready market at a cent and a half. Not a bad day for some of our collectors, whose pay envelope contains perhaps \$12 per week. A Newark collector has walked under the electric lights every warm evening for many years. He has thus aided his health,

got many rare moths, many tropical Sphingids for his own collection, and half a dozen times a year he can fill a six-quart pail with *Tropisternus triangularis* or *Benacus griseus* to go to some college for biological class room work at, perhaps, \$20 a pailful. This seems worth while.

There is something even more worth while. Love of the great "all out-doors" is its own reward. The world needs more Fabres, more Thoreaus, to transmit knowledge gained by keen and constant observation. For every hundred present casual observers there should be a hundred thousand. The things to see, to ponder over, are infinite. No Sunday afternoon "movie" show has a fraction of the interest of ten square yards of vacant city lot. There is no neglected, tangled corner in swamp or fallow field that does not teem with life, that does not afford far more profit to him who seeks patiently than the fabled Five Thousand Dollar Butterfly.

DESCRIPTION OF ELEVEN NEW SPECIES OF CHALCID FLIES.

BY A. A. GIRAULT, GLENNDALE, MD.

(Continued from page 103.)

Thymus, new genus of Tetrastichini.

Genotype—*Encyrtus albocinctus* Ashmead.

Encyrtus chionaspidis Howard.

Genotype of *Adelencyrtus* Ashmead. Frons subprominent, moderate in width. Mandibles tridentate, the third tooth truncate, yet with a concave apex. Marginal vein thrice longer than wide, the postmarginal and stigmal veins subequal, each about two-thirds the length of the marginal. Funicle 6 a little wider than long, 1 twice wider than long. Antennæ pale yellow, the pedicel above and distal club joint dusky. Fore wings very finely ciliate. Face much inflexed. Thorax dorsad flattened. Cheeks as long as the eyes. Runs very close to *Epiencyrtoides* Girault. The coxæ are white. The caudal femur and the flagellum are concolorous. Scutellum with somewhat rougher sculpture than the scutum. Axillæ very narrow, not quite meeting. Small. From the types in the U.S.N.M.

Baoanusia africana, n. sp.

Female—Length 1.35 mm.

Differs from the description of the genotype as follows: The club is only somewhat longer than the funicle; funicles 5 and 6 are white; the dorsal apex of the second tooth of the mandibles is tooth-like, appearing nearly as a small intermediate tooth; the marginal vein is only about twice longer than wide, subequal to the post-marginal, the stigmal somewhat shorter; only the tips of the tibiae, the tarsi (except last joint) and a band on caudal tibia just below the knee, are yellowish white (a broader band at base of middle tibiae); otherwise about the same. Scutellum with velvety appearance. Hairless line of fore wing with only about 4-5 loose lines of cilia proximad of it. Club obliquely truncate from the base of joint 3. Funicle 6 a little longer than 1, much wider.

The male has the knees somewhat pale, the frons distinctly broader, the facial inflexion less, the antennae inserted higher and with a long ridge-like carina between them. The antennae (except the pedicel) are reddish brown, the joints of the funicle excised and bearing two whorls of long hairs, 3 and 4 longest, over twice longer than wide, 1 about a half longer than wide, 6 a little shorter. Scape short and stout. Club solid, distinctly longer than the body of the scape, over thrice longer than wide.

Described from two males, four females in the U.S.N.M., labelled "Parasite of *Lecanium oleae*, Cape Colony, South Africa, C. P. Lounsbury."

Types—Catalogue No. 19920, U.S.N.M., the above specimens on a tag.

Catolaccus perdubius, n. sp.

Female—Length usual.

Differs from *nigroaeneus* Ashmead, which is the same in the female as *caeliadis* Ashmead in that the tibiae in both sexes are deep metallic blue-black (in the other species only lightly embrowned, more so at base), and the male is like the male of *incertus*. Differs from *incertus* Ashmead in that the funicle joints are all short, 6 only slightly shorter than 1, subquadrate, 1 slightly longer than wide, shorter than the moderate pedicel.

Described from a large number of each sex reared in connection with the strawberry weevil, St. Paul, Minnesota (S. Marcovitch).

Compared with types of the named species.

Types—Catalogue No. 19921, U.S.N.M., two males, four females on two tags, a female head and hind leg on a slide.

Hyssopus, n. gen. of Ophelinini.

Female—Agrees with the description of *Dichatomus* Foerster, but the scutellum bears the lateral grooves which join around the apex, and there is but one very short ring-joint (but the base of funicle 1 is rimmed like a second one). Club without a terminal nipple, distinctly 2-jointed. Propodeum with a distinct median carina and a lateral carina, which runs directly from the spiracle. Mandibles 7-dentate, 6 and 7 small, feebly divided. The large, quadrate pronotum longer than the scutum. Abdomen sub sessile, flattened, a little longer than the thorax. Cephalic tibia without a strigil, the spur short and straight. Marginal vein subequal to the submarginal, the stigmal slender, about a third of the length of the marginal, shorter than the postmarginal.

Hyssopus thymus, n. sp. (Genotype).

Female—Length 0.85 mm.

Very dark, nearly black, the wings hyaline, the thorax scaly, the propodeum glabrous, the trochanters, tips of tibiae broadly, and the tarsi yellow, the venation dusky yellow. Pedicel a half longer than wide, a half longer than funicle 1, which is a little longer than wide and longest, 2 and 3 wider than long (2 a little the shortest) 4 a little wider than long, larger than 3. Club ovate, wider than the funicle, its first joint largest. Marginal fringes of the fore wing a little longer than usual. Propodeum latero-dorsad distinctly pubescent. Tarsal joints not long.

Described from one female on a tag in the U.S.N.M., labeled "Lincoln, Nebraska, Webster No. 2142. G. I. Reeves."

Type—Catalogue No. 19922, U.S.N.M., the above specimen plus a slide bearing a fore and hind leg, the head and a fore wing.

Diglyphus maculipennis Ashmead. (Genotype of **Diglyphomorpha** Ashmead.)

Caudal tibial spur single (?), distinct. Mandibles 9-dentate. Antennae 8-jointed, without ring-joint, the club 2-jointed ending conically, not distinctly nipped. Parapsidal furrows complete, delicate. Axillae not advanced. Lateral grooves of scutellum nearly joined around the apex. Propodeum with a distinct median

carina, long, with a lateral obtuse sulcus, and between these, delicate (a few) curved rugæ; spiracles minute. Antennæ inserted a little below the middle of the face. Axillæ and scutellum polished. Head with scattered punctures. Abdomen glabrous, yellowish mesad along basal third or more (dorsal), Club 1 longest. Funicle 1 longest, about twice longer than wide, 4 barely longer than wide, larger than the small pedicel. Blotch on fore wing terminates distad at the apex of the stigmal vein and extends proximad along under most of the marginal. Postmarginal vein a third shorter than the stigmal, in a wing of one specimen; as described in the other. Original description otherwise about correct. From two female types in the U.S.N.M. (a slide bearing a head, wings and a hind tibia).

D. albipes Ashmead, male, is a *Sympiesomorphelleus*, and bears two caudal tibial spurs. Its colour description is correct, but the specimen is a female and is described above.

Pirene marylandica, n. sp.

Female—Length 0.80 mm., excluding the ovipositor, which is extruded for a third of the abdomen's length. Æneous black, the wings hyaline, the tips of tibiæ and proximal four tarsal joints yellowish white; tip of scape distinctly and funicles 1-3 silvery white. Postmarginal and stigmal veins subequal, short, the marginal slender yet somewhat shorter than the submarginal. Scape obclavate; pedicel distinctly longer than wide at apex, longer than funicle 5, which is largest, large but somewhat wider than long; funicles 1-3 like ring-joints (in the *Pteromalidæ*), no transverse-linear ring-joint present), 1-2 subequal, 3 larger, a third the length of 4, which is about half the size of 5. Club large, ovate, with a small terminal nipple, as long as the funicle. Flagellum with scattered minute hairs. Form as in *Parecristotes* Girault. Body finely scaly, the propodeum smooth, noncarinate. Legs not stout, the caudal femur a little compressed. Parapsidal furrows complete. Mandibles spreading, 4-dentate. Maxillary palpi 2-jointed apparently, the distal joint long.

Described from two females captured by sweeping meadows, September 30, 1915, at Hillmead (Glennedale), Prince George Co., Maryland.

Type—Catalogue No. 19924, U.S.N.M., one of the above specimens on a tag, the head and hind tibia on a slide.

A CLASSIFICATION OF OUR LIMNEPHILID CADDICE FLIES.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

The Limnephilidæ are the most prominent family of caddiceflies in temperate regions. Their classification has been largely based on the spur formula; this is undoubtedly valuable, but as it broke down in places, I have tried many times to find other characters. I divided the group into two on the presence or absence of spines on the under side of the last joint of the hind tarsi. Dr. Ulmer has brought up a few exceptions. Some I believe are due to the fact that the species is wrongly placed, but in certain *Chatopteryx* it does not hold, but when used in connection with the armature of the front tibiæ, it is decisive. The venation in this family is most distressingly uniform, and I have found little not already utilized. The large bristles back or inward of the ocelli I have used as of generic value; and the development of the strips of bristles on the mesothorax I also consider important. I had hoped to find more characters in the face, and palpi; and think that the vestiture of face may yet be used with success. However, I present this preliminary table in the hope that its use may discover the weak points and suggest new characters. I am loath to make so many new genera; but I believe that all are distinct groups, and future study may show some of them to be better placed as subgenera.

KEY TO THE GENERA OF LIMNEPHILIDÆ.

1. Last joint of hind tarsus with one or more distinct (usually black) spines beneath; tibia I always spined to base (*Limnephilina*) 2
- Last joint of hind tarsus without a distinct spine beneath; if one is occasionally present, then the tibia I is not spined to base (*Drusina*) 18
2. No prominent macrochætæ behind or inward from ocelli, although sometimes hairs much smaller than macrochætæ; tips of fore wings not obliquely truncate..... 3
- At least one prominent macrochætæ behind or inward from each ocellus, about equal in size to the macrochætæ of the posterior warts; tips of fore wings often obliquely truncate..... 13

3. Bristles on the veins no longer than those on the membrane, or barely so; membrane not granulate; median part of mesonotum with some bristle-bearing granules; the pronotum rather large; hind wings much excised on outer margin. 4
 Bristles on the veins noticeably longer than those on the membrane; median part of the mesonotum without bristle-bearing granules; hind wings scarcely excised on outer margin..... 5
4. Outer margin of fore wings sinuately emarginate; vertex without distinct posterior warts *Glyphotelius*.
 Outer margin of fore wings not emarginate; posterior warts distinct *Arctæcia*.
5. In hind wings a cross-vein between the subcosta and radius near tip; vertex convex, smooth, posterior warts reduced *Astenophylax*.
 No such cross-vein in the hind wings, vertex flat; posterior warts well developed..... 6
6. Vertex, part of thorax, and fore wings with dense appressed hair; basal cross-veins very weak; fore wings not granulate, with a median silvery stripe..... *Hesperophylax*, n. gen.
 (*Platyphylax occidentalis* Bks.)
- Vertex not with dense appressed hair..... 7
7. Spurs 1, 2, 2, in hind wings the discal cell does not reach before the median fork; fore wing roughened. *Allegophylax*, n. gen.
 (*Platyphylax subfasciata* Say).
- Spurs 1, 3, 3, or 1, 3, 4..... 8
8. Spurs 1, 3, 4..... 9
- Spurs 1, 3, 3..... 11
9. In the hind wings the discal cell reaches plainly before the forking of the median vein..... 10
 In the hind wings the discal cell not before the forking of median vein; membrane of fore wings roughened *Eustenace*, n. gen.
 (*Stenophylax limbatus* McL.)
10. Large species; wings very broad; in fore wings the front side of discal cell is slightly concave..... *Stenophylax*.
 Smaller species: elongate wings; in fore wings the front side of discal cell is nearly straight..... *Rhadicoleptus*.

11. In the hind wings the discal cell but little if any before the forking of the median vein; second apical cell of fore wings wide at base, membrane granulate.....*Pycnopsyche*.
In the hind wings the discal cell plainly before the forking of median vein.....12
12. Large full winged species; membrane not granulate *Clistoronia*, n. gen.
(*Halesus magnus* Bks.)
Small, female short-winged; hairs on the membrane of fore wing as long as those on the veins.....*Psychoronia*, n. gen.
(*Psilopteryx brevipennis* Bks.).....14
13. Anal cell not divided at base; spurs 1, 3, 3; fourth apical cell in hind wings broad.....*Platycentropus*.
Anal cell divided as usual at base; spurs usually 1, 3, 4.....14
14. Fifth joint of tarsus I with spines beneath; bristles on veins barely longer than on the membrane.....*Grammotaulius*.
Fifth joint of tarsus I without spines beneath; bristles on veins much longer than those on membrane.....15
15. Hind wings strongly emarginate on outer margin near end of the cubitus; pronotum large and prominent; discoidal cell very long.....16
Hind wings scarcely emarginate at end of cubitus; pronotum less prominent.....17
16. Fore wings long and slender, tips rounded.....*Anabolina*.
Fore wings shorter, tips more acute; pronotum longer *Colpotaulius*.
17. Fourth apical cell in hind wings narrowed at base; mesothoracic strips long; outer margin of fore wings oblique *Limnephilus*.
Fourth apical cell in hind wings not narrowed at base; mesothoracic strips short; outer margin of fore wings more rounded *Anabolia*.
18. Bristle-bearing granules scattered over the mesonotum without leaving a median smooth area; pronotum large and prominent; fork 3 in both wings pedicellate; spurs 1, 3, 4.....*Leptophylax*.
Bristle-bearing granules arranged in two strips, leaving a smooth median area.....19

19. Posterior and anterior anastomoses of fore wings not separated; no macrochætæ behind ocelli; forks 1 and 3 in hind wings pedicellate; spurs 1, 3, 4.....*Homophylax*.
 Posterior anastomosis at least width of a cell before the anterior anastomosis..... 20
20. Outer margin of fore wings sinuately excised; macrochætæ behind ocelli; spurs 1, 2, 2.....*Glyphopsyche*.
 Outer margin of fore wings entire..... 21
21. Fork 3 absent in hind wings..... 22
 Fork 3 present in hind wings..... 23
22. Spurs 1, 3, 3; no wart between ocelli and the posterior warts.....*Oligophlebodes*.
 Spurs 1, 2, 2; a distinct wart between the ocelli and the posterior warts.....*Neophylax*.
23. Stigma with a cross-vein at its base, or at least strongly coriaceous..... 24
 Stigma without cross-vein, and not especially prominent..... 27
24. First apical cell narrowed at base; stigma not very prominent, but with cross-veins at base..... 25
 First apical cell broad at base; stigma coriaceous..... 26
25. Spurs 1, 2, 4; discal cell of hind wings open.....*Apatania*.
 Spurs 1, 3, 4; discal cell of hind wings closed.....*Allomyia*, n. gen.
 (*Apatania tripunctata* Bks.)
26. Spurs 1, 3, 3; membrane not granulate nor roughened.....*Haleschila*.
 Spurs 1, 2, 2; membrane more or less granulate; hairs on membrane as long as those on the veins.....*Chilostigma*.
27. Each cheek with a prominent spine beneath; first apical cell extending a long way back on the discal cell.....*Allophylax*
 No such spine on the cheek..... 28
28. A large tuft of long hairs at anal base of fore wings; outer fringe on coxa I. longer than width of coxa; antennæ strongly crenulate beneath; ocelli large; tibia I densely spined to base; bristles of veins not prominent; in hind wings discal cell reaches long before forking of median vein; large species.....*Dicosmæcus*.

- Hair at anal base shorter, less dense, and that on anterior coxæ short; smaller species; bristles of veins usually distinct.....29
29. Spurs 1, 3, 3.....30
Spurs 1, 2, 2, or 1, 2, 4, or 1, 3, 4.....32
30. Anal cell not divided at base; basal veins obsolete; radius bent at stigma; an ocellar macrochaeta.....*Hylepsyche*, n. gen.
(*Halesus indistinctus* Walk.)
- Anal cell divided as usual, most of basal cross-veins distinct.....31
31. Radius bent at stigma, which is very distinct; membrane not granulate.....*Halesochila*.
Radius scarcely bent at stigma, which is not especially distinct; no ocellar macrochaeta.....*Drusus*.
32. Spurs 1, 3, 4; no distinct ocellar macrochaeta.....33
Spurs 1, 2, 2, or 1, 2, 4.....35
33. Fork 3 in fore wings acute at base, sometimes pedicellate.....*Algonquina*, n. gen.
(*Parachiona parvula* Bks.).
- Fork 3 in fore wings not acute, but reaching before the anastomosis.....34
34. Anastomosis is placed before end of the subcosta; the apical cells very long.....*Anisogamus*.
Anastomosis beyond end of the subcosta, apical cells normal.....*Apolopsyche*, n. gen.
(*Stenophylax minusculus* Bks.)
35. Ocellar macrochaetae present; spurs 1, 2, 4; wings rather narrow, first fork reaches a long distance back on discal cell.....*Ecclisomyia*.
Ocellar macrochaetae absent, spurs 1, 2, 2, or 0, 2, 2; membrane granulate.....36
36. Discal cell shorter than the pedicel or barely longer.....*Potamorites*.
Discal cell much longer than its pedicel.....37
37. Radial vein scarcely bent at the stigma, wings less broad.....*Ironoquia*.
(*Chætopterygopsis parvula* Bks.).
Radial vein strongly bent at the stigma; wings broad.....*Chilostigma*.

NOTES ON THE GENERA

Arctæcia—Includes *A. consocia* Walk. The genus *Philarctus* is very close and perhaps identical.

Hesperophylax and *Allegophylax*—These were formerly included in *Platyphylax*, but, as already noted by McLachlan and Ulmer, not congeneric. *Allegophylax* also includes *P. lepida* Hag.

Eustenace—Includes also the *Stenophylax gentilis* of McLachlan.

Rhadicoleptus—Our *Asynarchus fumosus* and *A. flavicollis* will go in Wallengren's genus, and are quite different in appearance from the typical broad winged *Stenophylax*.

Asynarchus—The type species, *A. fusorius*, will run to *Anabolia*, and I see little reason for separating it; various other species, *iteratus*, *amurensis*, etc., will also go to *Anabolia*, but *A. cænosus* runs to *Stenophylax*; it should form another genus.

Clistoronia and *Psychoronia* include each only a single species.

Allomyia includes but one species.

Drusus—In this I include *Halesus sparsus* Bks. from Newfoundland.

Halesus—I do not find any true representatives of this in our fauna; in the above table it would run out near *Platycentropus*, having ocellar macrochaetae, and 1, 3, 3 spurs; but the anal area is normally divided.

Ecclisomyia—The European *Ecclisopteryx* has spurs 1, 2, 3; first fork not so far back on discal cell, and no ocellar macrochaetae.

Algonquina, type *Parachiona parvula* Bks., I propose for several species which I formerly kept in *Parachiona*, but the latter is quite different.

Ironoquia—Includes only the one species I have previously placed in *Chatopterygopsis*. In this latter genus there are ocellar macrochaetae. The genera *Heliconius* and *Anisitella* are really *Chatopterygopsis* with a variation in spur formula; they have the same peculiar fore wings, and also ocellar macrochaetae. *Catadice* has no ocellar macrochaetae.

Limnephilus—This genus contains by far a larger number of species than any other genus in the family, and several are rather aberrant and show affinity to *Anabolia*. *Goniotauius* should be maintained, but I have not been able to find characters, except that the ocellar macrochaetae are nearer to each other than in the true *Limnephilus*.

TWO DIPTERA OF THE GENUS RHAMPHOMYIA FROM COLORADO.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The large and varied genus *Rhamphomyia* (Empididæ) is known to be of considerable antiquity, no less than twelve species having been described by Meunier from Baltic Amber. It is therefore not surprising to find a species in the Miocene shales at Florissant.

Rhamphomyia sepulta, n. sp.

Length 6 mm.; length of wing 5.65 mm.; wings brownish, no stigmatic cloud; head, thorax and legs black; abdomen slender, pallid; eyes well separated on vertex (the specimen apparently a female); antennæ with third joint elongate, but not so long and slender as in the amber species *R. errabunda*, *adaloides* and *obtusa*. Venation of wings normal for the genus, the third longitudinal vein simple; anal lobe large and abrupt, the lower margin before the lobe with small bristles as in recent species; second anal vein continuing in a straight or nearly straight line apicad, not deflected downward at the basal corner of the anal lobe. The following measurements are in microns: Level of humeral cross-vein to separation of second and third veins, 720; end of second vein to end of third (in a straight line), 640; discal cell on first basal, 240; discal cell on second basal, 304; discal on second posterior, 80; discal on third posterior, 320; upper side of discal, 800. Miocene shales of Florissant, Colorado, Station 13 (S. A. Rohwer).

I take occasion to describe also a living species from a high altitude.

Rhamphomyia calvimontis, n. sp.

Male—Length 6 mm.; length of wing 7.5; shining black, with long black hair on head and dorsum of thorax; the face has a little black hair, a character of *Neocota* Coq., but the species does not seem otherwise allied to the type of that genus; sides of thorax grey-pollinose; abdomen with glistening creamy-white hair, a stiff band of bright ferruginous hair on the ventral surface subapically (0 in figure); wings grey. Metapleural bristles present. Legs entirely black. In Coquillett's key (Proc. U. S. Nat. Mus., XVIII, pp. 410-418) it runs next to the Californian *R. duplicis*. It is not identical with any of the species since described from

Alaska. Compared with *R. duplicis*, it is larger; eyes contiguous above, but the facets practically equal in size; antennæ black,

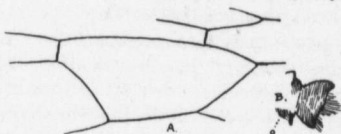


Fig. 2—A. *Rhamphomyia sepulta*: discal cell.
B. *Rhamphomyia calvimontis*: lateral view
of end of male abdomen.

third joint sublanceolate, the style about half its length; proboscis over 2 mm. long; thorax without dorsal pollinose vittæ; scutellum with numerous (many more than six) long black hairs; front and

hind basitarsi large and hairy, middle ones small; knob of halteres dark brown. The second anal vein, differently from the fossil, is abruptly deflected downward at the basal corner of the anal lobe. In Bezzi's key of South American *Rhamphomyia* (1909) this falls nearest to *R. limbipennis* Bezzi. Above timber-line, in the Arctic-Alpine zone, Baldy Mtn., Boulder County, Colorado, July 24, 1915. (Cockerell.)

I take occasion to correct two misprints in former papers on Diptera. In *Can. Ent.*, 1915, p. 316, read *Chironomus guatemaltecus*; and p. 351, in fourth line of description, read greyish instead of greenish.

NEW SPECIES OF EUTETTIX AND PHLEPSIUS (HOMOPTERA).

BY E. D. BALL, LOGAN, UTAH.

The genus *Eutettix* is one of the most interesting of the groups of leaf-hoppers in the diversity of food plants of the different species, and at the same time in the constancy with which a given species is confined to its host.

At the time the writer published the review of this genus little was known of the life-histories or food plants of a number of western species of the *strobi* group. From circumstantial evidence it was thought that *saucia* would probably be found to occur on *Eriogonum*. Since that time this species has been found in some numbers on a species of this plant in California. The type specimens of *columbiana* described below were taken from

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another species of this same genus of plants. The type of *nevada* from still another, while the type of *rubida* came from a location in which a species of *Eriogonum* grew and the colour of the plant would harmonize better with the striking shade of red of the insect than any other plant there. In addition to these records, *pannosa* has been found to be strictly confined to a shrubby species of *Eriogonum* on the hills of California. Another record which again shows diversity in food plants is that of *osborni*, which has been found by Van Duzee to be strictly confined to a species of *Tamarix* in California.

***Eutettix columbiana*, n. sp.**

Resembling *perelegantis* and *mildredæ*, but lighter in colour and lacking the definite shades of orange and olive. Form of *saucia* nearly. Length: ♂ 5 mm.

Vertex roundly right angled, the apex blunt, disc slightly sloping, depressed before the margin. Pronotum as in *saucia*, lacking the definite gibbous appearance of *perelegantis*. Venation as in *saucia*.

Colour ivory white, with a pale tawny and olive brown saddle with black points. Vertex creamy, with traces of four brown points on the margin, a pair of rather large irregular spots on the posterior submargin a little more than their own width from the eyes. Face and below creamy. Pronotum ivory, mottled with olive and brown, omitting the lateral and most of the anterior margin; two definite black spots behind the inner angle of either eye and two irregular ones nearer the median line. Scutellum creamy, the lateral angles olive brown. Elytra ivory sub-hyaline, with an olive brown saddle as in *saucia*, but lighter or wanting along the sutures, and with three definite dark points extending almost to the claval suture, apical cloud reduced to spots on third and fourth nervures.

Genitalia of male as in *saucia*.

Described from two males from Wenatchee, Washington, collected by the writer. From *saucia* this species can be separated by the definite black spots on the pronotum, from *perelegantis* by the structure of head and pronotum.

Eutettix nevada, n. sp.

Form of *saucia* nearly, with a similar saddle. Colour of *texana* or a pale *pannosa*. Length: ♀ 4.6 mm.

Vertex similar to *saucia*, slightly less sloping, pronotum very flat, much less arched than in *saucia*. Front very full, roundly right angled with vertex. Venation as in *pannosa*.

Colour creamy white, mottled and washed with pale olive brown. Vertex creamy, traces of four brown spots on anterior submargin, three large, slightly irregular mottled areas along the posterior margin, the median one nearly rectangular, the lateral ones nearly circular. Pronotum mottled with pale brown, omitting the lateral margins and three narrow stripes on the disc. Scutellum mottled with pale brown, with two stripes. Elytra milky with the saddle of a pale mottled brown, omitting an irregular sutural stripe. The ivory margin along the claval suture is narrow and regular as in *pannosa*, without the posterior enlargement, as in *scitula*, and without the usual distinct dark margins. The saddle extends to costa, but the apical cloud is reduced to a few reticulations. A number of strong reticulations on basal area of the corium below the saddle.

Genitalia: Female segment rather long, slightly rounding posteriorly, with a slight, rather broad strap-shaped projection, which is dark-lined back on to the segment.

Described from a single female collected at Wells, Nevada, by the writer. The short head will separate this species from *pannosa*, while the strongly margined saddle renders it quite distinct from *saucia*. Its mottled appearance suggests *texana*, but that species does not have a saddle.

Eutettix rubida, n. sp.

Form of *pannosa* nearly. Shorter and broader with short apical cells. Colour and pattern of *saucia* nearly. Length: ♀ 4 mm.

Vertex and pronotum nearly flat as in *pannosa*. Vertex broader than in that species and equally long, the apex slightly obtusely angled. Whole margin inclined to be thin and slightly upturned before the depression. Elytra very broad and short.

Venation similar to *saucia*, except that the apical cells are only one-half as long. The central apical cell equally broad and long.

Colour red-brown and ivory. Vertex testaceous, the margins ivory, with four large nearly quadrangular spots before the depression. Pronotum densely mottled with rusty brown, omitting the lateral margins. Scutellum rusty brown. Elytra ivory, with a dark rusty brown saddle of the *saucia* pattern, the line next the claval suture nearly straight and not dark margined, the apical cells densely clouded.

Genitalia: Female segment moderately long, nearly truncate, with a broad, short, bilobed projection.

Described from a single female taken by the writer in Logan Canyon, Utah, altitude 6,000 feet. This is a strikingly distinct species, in the broad short form, short apical cells and long flat vertex.

***Eutettix insana* var. *coronata*, n. var.**

Slightly smaller and paler than *insana*, with a variable number of black spots. Length 3 mm.

Vertex and pronotum shorter and broader than in *insana*. Elytra shorter and inclined to be more flaring.

Colour white as in *Phlepsius denudatus*, rather than green, as in typical *insana*, with a much smaller number of the "peppered" dots and a variable number of black spots. These black spots including all or part of the following: A pair of slightly oblique lines behind the middle of the vertex, six dots in an arcuated line on the anterior submargin of pronotum, the outer ones usually largest and located just behind the inner angle of the eye, four large black spots in a slightly curved line on the anterior part of the scutellum, two minute points on the lateral margins of the scutellum, four pair of equidistant spots along sutural margins of elytra, the third and largest pair at the claval apices, four spots on each elytron in an approximately straight line between the posterior angle of the pronotum and the second costal nervure, the first two in this row slightly in advance of the corresponding sutural spots, the second two opposite. These spots are all variable in size, and some are often wanting.

Described from two females and two males from Mojave, California, collected by the writer. This is a much smaller and

paler form than typical *insana*, and with the definite spotting would not be easily recognized as belonging to that species.

Eutettix (Mesamia) coloradensis var. **visalia**, n. var.

Form of *coloradensis*. Pale fulvous, with light flecks on elytra.

Colour and general appearance of *johnsoni*, except for the black points on vertex. Vertex and face pale fulvous, with the line wanting or only slightly indicated in tawny. Pronotum and scutellum pale fulvous without definite markings. Elytra with the claval areas pale fulvous more or less flecked with oblong milky spots. Corium fulvous sub-hyaline, the nervures tawny and usually a tawny spot between the two cross nervures and faint dusky spots in the centres of the apical cells.

Described from two females and two males from Visalia, California, collected by the writer on *Artemisia dracunculoides*. If this had not been the food plant to which *coloradensis* is strictly confined this variety would scarcely have been referred to this species, as the colour is so strikingly different. The finding of this colour variety indicates a closer relationship between the *nigrodorsum* and *vitellina* groups than was even suspected when they were placed in the same subgenus.

Phlepsius loculatus, n. sp.

Resembling a diminutive *costomaculatus* in appearance, but much smaller. White, with two stripes and coarse elytral reticulation dark. Length 3-3.5 mm.

Head with the eyes much wider than pronotum; vertex narrow, slightly longer than its basal width, as long as pronotum, slightly obtusely angled with the apex bluntly rounding, disc nearly flat, anterior margin forming an acute angle with the front; front long, narrow, wedge-shaped. Elytra long, narrow, venation as in *costomaculatus*, the apical cells extremely long.

Colour dark brown or black and white, giving an ashy gray appearance. Vertex milky white or sometimes suffused with yellow, two pair of brown dots on the extreme margin against the apex, a pair of slightly oblique, elongate, egg-shaped dark spots extending from just behind the anterior pair of spots to posterior margin, each dark spot containing two light spots in the shape of an oblique crescent above a dash. Sometimes the dark spots

coalesce with the outer dots when the whole appears as a pair of stripes, in which case the crescent and dash fuse to form a question mark. Pronotum milky, with four broad, mottled, dark brown stripes, the outer pair definite and touching the inner angle of the eye, the inner pair irregular and often fading out posteriorly. Elytra milky with the most of the nervures and a few coarse reticulations as in *costomaculatus* almost black.

Genitalia: Female segment short, posterior margin slightly indented in the middle, pygofer extremely long and almost parallel margined. Male valve triangular, plates together equilaterally triangular.

Described from four females and four males from St. George, Utah, and Mojave, California, collected by the writer. This species is quite puzzling in character; in elytral characters it is close to *costomaculatus*, but differs radically in the extremely wide head. In size it is unique in the genus, but in *Deltocephalus* where the occasional second cross nervure would, if considered, place it, it would seem at home. It is, however, unquestionably related to the other forms mentioned. The white markings in the black spots are a striking and very distinctive character.

Phlepsius stellaris, n. sp.

Larger and stouter than *loculatus*, which it resembles in form and structure, resembling *denudatus* in the light colour and lack of reticulations. Creamy white, with two star-like spots on vertex. Length: ♀ 4 mm.

Head broad as in *loculatus*, vertex shorter and broader, obtusely rounding, scarcely longer on middle than against the eye, two-thirds the length of the pronotum. Front shorter than in *loculatus*, forming a wider angle with vertex. Elytra long, narrow, venation as in *costomaculatus*, but obscure.

Colour creamy white, the ocelli and four equidistant spots on vertex margin between these dark, a pair of irregular star-shaped spots on the anterior disc of the vertex, one ray of each star, including the outer marginal spot, on either side and another touching the eye; a spot on either side of scutellum at base, extending forward under the semitransparent pronotum, and often a dot or two behind the eyes. Elytra creamy, the nervures showing

a trace of fulvous, rather obscure. Face and below creamy, a pair of brown arcs on either side of the front between the antennal sockets, attached to a brown cloud in the centre, forming a spider-like marking on face.

Genitalia: Female segment broad and short, almost parallel margined with a slight median notch.

Described from four females from St. George, Utah, and vicinity collected by the writer. This species, although still small for the genus, is nearly twice as large as *loculatus*, to which it seems to be allied. The white ground colour, with the black stars, render it strikingly distinct.

A NEW *PHYSOTHRIPS* (THYSANOPTERA) FROM
UGANDA, WITH A NOTE ON *PHYSOTHRIPS*
ANTENNATUS BAGNALL.

BY J. DOUGLAS HOOD, U. S. BIOLOGICAL SURVEY, WASHINGTON, D. C.

The new species here described from a unique female was received from Dr. Henry J. Franklin, of the Massachusetts Agricultural Experiment Station, and had been included with a number of specimens of *Physothrips antennatus*, collected by Mr. C. C. Gowdey at Kisube, Uganda.

***Physothrips antennatus*, Bagnall.**

1914.—*Physothrips antennatus* Bagnall, Ann. Mag. Nat. Hist., ser. 8, Vol. XIII, p. 23.

1914.—*Physothrips antennatus* Karny, Zeitschr. f. wiss. Ins.-biol., Bd. X, p. 365.

The brief original description of this species may be amplified as follows:

The median dorsal length of the head is about 0.7 the width across eyes, and about three-fourths the length of the prothorax; the cheeks are gently rounded, converging to base. The pronotum is finely and deeply striate, with a pair of nearly smooth, foveate areas behind middle; hind margin with three pairs of bristles between the two long pairs, the mediad pair larger; disk with about 25 small bristles on each side. Mesonotum slightly more closely transversely striate than the pronotum; metanotum sub-

concentrically striate. Wings brown, basal fourth much paler, gray. Segment 8 of abdomen unarmed, without the usual comb-like fringe on posterior margin.

***Physothrips xanthocerus*, sp. nov.**

(Fig. 3, a and b.)

Female (macropterous).—Length about 1.1 mm. Colour dark blackish brown, nearly black, with antennal segments 3-8, all tarsi, and distal half of all tibiae, light lemon yellow; fore wings brown, pale gray in basal fourth.

Head about three-fourths as long as greatest width, sides rounded and converging to base; occiput with several anastomosing

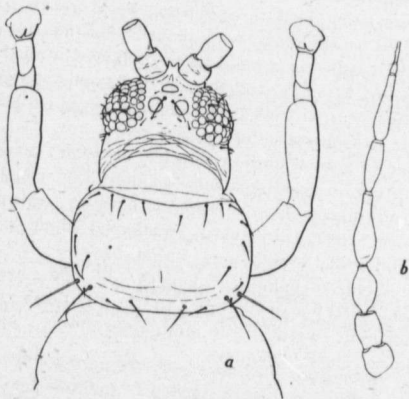


Fig. 3.—*Physothrips xanthocerus*, n. sp., female, holotype; b, antenna.

lines; intercellular bristles less than one-fourth as long as head, situated well within the ocellar triangle; a pair of smaller bristles in front of, and a second pair behind posterior ocelli; postocular bristles small, three pairs in profile at posterior angles of eyes. Eyes about 0.6 as long as head and slightly narrower than their interval. Ocelli equidistant, subequal in size, posterior pair opposite middle of eyes. Antennae about three and one-fourth times as long as head, form of segments shown in figure, unusual

in that fourth segment is very long and produced distally into a narrow stem; segments 1 and 2 nearly concolorous with head, 3-8 lemon yellow, the three distal segments shaded with gray.

Prothorax about 1.1 times as long as head and about 1.7 times as wide as long; pronotum smooth, absolutely without sculpture; two strong dark bristles at posterior angles, and between these along posterior margin two smaller pairs, the inner larger; anterior and lateral margins each with about five pairs of small, subequal bristles, in addition to a similar pair at the anterior angles and a slightly stronger pair almost directly in front of the inner long pair at posterior angles; no other pronotal bristles. Wings of fore pair about fifteen times as long as width at middle, dark gray-brown in distal three-fourths, basal fourth pale gray, slightly clouded basally; costa with about 28 bristles; anterior vein with four pale bristles in a basal group, followed immediately by another series of 13 or 14, and then by two, well separated, near apex; posterior vein with 16 or 17, commencing just beyond the first bristle in the long series of anterior vein.

Abdomen of normal form, with a few very faint anastomosing lines of sculpture on basal segments; segment 8 unarmed, without the usual comb-like fringe on posterior margin; segment 10 not divided above, though irregularly weakened along dorsal line near apex; abdominal bristles long, strong, brown.

Measurements of holotype: Length 1.08 mm.; head, length along median dorsal line, 0.105 mm.; width, 0.140 mm.; prothorax, length 0.114 mm.; width 0.194 mm.; pterothorax, width 0.255 mm.; abdomen, width 0.300 mm.

Antennal segments.....	1	2	3	4	5	6	7	8
Length (μ).....	29	36	50	75	53	67	11	22
Width (μ).....	32	26	26	23	16	17	7	5

Total length of antenna, 0.343 mm.

Described from one female collected by C. C. Gowdey, at Kisube, Uganda, on coffee (No. 3582).

Closely allied by the elongate fourth antennal segment to *Physothrips antennatus* and *Ph. antennalis*, but differing from both in the pale antennæ, and from the former, at least, in the smooth, sparsely spinose pronotum.

THE LIFE-HISTORY OF *LEUCOBREPHOS BREPHOIDES*
WALK. (LEPIDOPTERA).*

BY ARTHUR GIBSON AND NORMAN CRIDDLE.

Leucobrepbos brephoides Walk. was for several years known in Canadian collections as *L. middendorfi* Men. It was not until 1907† that the late John B. Smith corrected the error and stated that the former "is the only species thus far known to inhabit North America." In the Entomological Record, for the years 1901 and 1903, the species is recorded under the name *middendorfi*, which name is also used by Fletcher in *The Ottawa Naturalist*, XXIII, 67.

We have been much interested in the habits and life-history of this interesting and rare moth. In 1903, the junior author forwarded to the late Dr. James Fletcher some eggs of the species, and these and the larvæ were then studied, as time permitted, by Fletcher and the senior author. In 1915, Mr. F. H. Wolley-Dod forwarded, to Ottawa, 35 eggs, which had been obtained at Midnapore, Alta., on April 5-10. These latter gave us an opportunity of studying, more definitely, the preparatory stages. The notes made by Fletcher, in 1903, were incomplete, but such as are of value we include herewith.

The Egg.—0.5 mm. in diameter; 0.9 mm. in length; oblong, rounded at both ends; indistinctly longitudinally striate; densely granulate-punctate, the granules acute and irregularly connected to form faint transverse ridges.

When received from Mr. Dod (April 20) the ova were darkened preparatory to hatching. Fletcher, in ms., states that the colour of the egg is "pinkish-ochre at first, turning a leaden gray before hatching." The egg shell is opalescent; the larva emerges through a rather large, ragged, hole at one end.

The eggs which were sent to Fletcher in 1903 were laid in confinement at Aweme, Man., on April 15-16. Fletcher's ms. note reads: "Laid on the leaf scars of young shoots of *Populus tremuloides*, above the scar, and deposited flat on their sides, 2 or

*Contribution from the Entomological Branch, Department of Agriculture, Ottawa.

†Canadian Entomologist, XXXIX, 370.

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3 sometimes at a single scar." The junior author has frequently found the eggs under natural conditions near the tips of the branches of Aspen Poplar, the place selected being the scar left by the fallen leaves of the previous autumn. Oviposition has been noted high up among the terminal twigs of trees, thirty feet or more in height; at other times the female moths were observed to choose a tree of about five feet in height. As a rule, not more than one egg is deposited on a leaf scar. From close observation, made on three occasions, a single female moth undoubtedly deposits several eggs on the same tree. In one instance the junior author noticed a female visiting at least a dozen different situations on the same tree for the purpose of oviposition. The largest number of eggs obtained from a single female was 135. This individual was collected at Aweme, Man., on 14th April, 1903, and in confinement continued ovipositing for six days.

The eggs which were deposited at Midnapore, Alta., on April 5-10, mostly hatched at Ottawa, on April 21 and 22.

DESCRIPTION OF LARVAL STAGE.

First Instar.—The newly-hatched larva is 2.0 mm. in length and dark-green in colour. Head 0.3 mm. wide, rounded, somewhat quadrate, darker than body, of a greenish-brown shade, margined posteriorly with brown; ocelli black. No markings on body; lateral area and dorsum of first thoracic segment, paler. Tubercles pale brownish, indistinct, circled with sordid whitish; setæ short, stiff, very conspicuous. Spiracles brown. First three pairs of prolegs aborted. Feet concolorous with body. After feeding, the larva is of a greenish-gray colour.

Second Instar.—Length 5.5 mm. Head 0.6 mm. wide, greenish-white, with dark green blotches, particularly on cheeks; ocelli black; mandibles pale reddish. Body marked longitudinally with pale white stripes as follows: addorsal stripe; subdorsal stripe wider than addorsal stripe; lateral stripe, just above tubercle iii; wide stigmatal band enclosing tubercles iv and v (the skin here is conspicuously wrinkled); and a rather indistinct medio-ventral stripe. Ventral surface distinctly glaucous. Tubercles brown. Spiracles dark brown, white in centre. Prolegs concolorous with venter. As the stage advances the skin of dorsum, particularly

on posterior segments, assumes a yellowish-green tint. The wide stigmatal band is the most conspicuous marking on the body.

Third Instar.—Length 8 mm. Head 0.9 to 1.0 mm. wide. The larva in this instar is similar in appearance to the second instar. The venter is decidedly glaucous. All the stripes are distinct and white in colour. The stigmatal band is wide and conspicuous, and more or less tinged with yellow. Length before third moult 10.5 mm.

Fourth Instar.—Length 12 mm. Head 1.5 to 1.7 mm. wide. Body dark velvety green, later becoming a paler green. The addorsal and lateral stripes irregular but distinct; stigmatal band very conspicuous, extending to end of anal flap, the edges being even. Medio-ventral stripe inconspicuous. All markings white. Tubercles circled with white. Venter distinctly glaucous. Length before fourth moult 15 mm.

Mature larva—Fifth Instar.—Length 18 mm. Head 2.2 to 2.5 mm. wide, rounded, somewhat quadrate, depressed at vertex; smooth, paler green than body and of a glassy appearance; clypeus high; ocelli black, between the ocelli the skin is whitish, like enamel; labrum also whitish; mandibles reddish-brown. Body cylindrical, lettuce green* in colour, with a yellowish reflection, excepting venter, which is glaucous. The folds between the segments are yellowish. The addorsal stripe, the subdorsal stripe and the lateral stripe are thinner than in previous instars and hence are not so distinct. In colour they are now decidedly yellow. The wide, bright pale-yellow stigmatal band is very conspicuous from the back of the head to the end of the anal flap, where it narrows. The two dorsal and the lateral stripes are more or less broken and sinuous in outline. The lateral stripe is distinctly wavy on the thoracic segments. Medio-ventral stripe now distinct, of a milky white colour. Spiracles whitish, ringed with black. Tubercles minute, circled with pale yellow, each bearing a short black hair. On abdominal segments tubercle iii is nearly midway between the lateral line and the spiracle, and immediately above the spiracle, excepting on segments 6, 7, 8, 9 and 12, where it is noticeably

*Ridgeway's Colour Standards and Colour Nomenclature, 1912.

anterior. Tubercle iv, behind the spiracle, v almost immediately below the spiracle, both enclosed in the stigmatal band, the former near the upper edge and the latter near the lower edge. Thoracic feet pale, somewhat translucent; prolegs concolorous with sub-ventral area; crotchets slightly pinkish; legs on segment 10 normal, on segments 9, 8 and 7 much reduced, the latter being the smaller and decidedly rudimentary. Length of full grown larva at rest 26 mm.

The Pupa.—Length 12-14 mm.; width at widest part 5 mm. When newly formed green, soon changing to pale brown, and later to dark reddish-brown; thorax and wing-covers darker, almost blackish, wrinkled; abdominal segments coarsely pitted on anterior three-quarters and minutely pitted on posterior one-quarter. Spiracles pale yellowish in centre. Cremaster two-spined, the spines stout and arising from either side, curved outwardly from towards the tip, and forming, almost, a perfect letter U.

Food Plant.—All larvæ reared at Ottawa were fed on the foliage of Aspen Poplar, *Populus tremuloides* Michx. This tree is the only food plant upon which we have found the larvæ feeding under natural conditions.

HABITS OF LARVA.

During the different instars the larvæ spun considerable silk. Under natural conditions, at Aweme, Man., they have been frequently observed hanging at the end of a silken thread spun from the branches of Aspen Poplar. This habit and that of looping when walking corresponds well with many of the Geometridæ. A ms. note by Fletcher reads as follows: "A semilooper, the three first pairs of abdominal legs not used in walking, although apparent. When at rest the young caterpillar rests as a geometer on the anal and fourth pairs of abdominal prolegs, with the front of the body raised. The larvæ have the same habit as *Brephos infans* of catching several leaves tightly together with single threads, and when resting, either lie along the petiole or inside a curl of a young leaf. When they began to feed, they attacked the edge of a leaf or ate straight into the surface either above or below."

When mature the larvæ entered the earth to pupate. The larvæ studied in 1915 were full grown on May 15 and 16. By May 20 all had changed to pupæ. The earthen cell is slight.

On June 13, 1902, two larvæ in the last instar collected at Aweme, Man., were received at Ottawa. On the earth in the breeding jar small pieces of bark and rotten wood were placed to see if the larvæ would use such for pupation. Both specimens, however, entered the earth (June 14) and there transformed to pupæ (June 17).

HABITS OF THE ADULT.

The moth of *Leucobrepfos brephoides* is a sun-loving creature, being most active between the hours of 11 a.m. and 3 p.m. It is among the earliest of the moths to appear in spring. It has been collected in Manitoba as early as March 18 and as late as May 11. The time of emergence from over-wintering pupæ is, of course, largely governed by the prevailing climatic conditions. It is not unusual to see the moths on the wing before the snow has all disappeared. Oviposition habits have already been referred to. Owing to a quick, jerky, flight and habit of darting upwards at the least sign of alarm, and also in view of the fact that the moth has a marked colour resemblance to the surrounding landscape, it is difficult to follow with the eye and individuals, therefore, are extremely hard to catch. Its remarkably acute eyesight and habit of flight undoubtedly account for its rarity in collections.

Experiments with the usual "sugar" mixtures, in daytime instead of at night, indicated that such are of no value to attract the moths. They have, however, on several occasions been induced to alight upon putrid flesh, which had been placed on the ground. The moths also seek moisture and are often found frequenting muddy roadways in the vicinity of aspen woods.

Distribution.—Midnapore, Alta., April 12-19, 1914 (Tams), April 7-10, 1915 (Dod and Tams); Saskatoon, Sask., April 11, 1913 (Willing); Beulah, Man., April 16, 1903 (Dennis); Aweme, Man., collected almost every year since 1901, earliest date March 18, latest date May 11 (Criddle Bros.); Rounthwaite, Man. (Marmont); Winnipeg, Man., April 17, 1910 (Wallis); Hymers, Ont., April 9, 1908 (Dawson); Mayo River, Yukon Territory, April 16, 1907 (Davidson); Portage at Grand Falls, Hamilton River, Labrador, May 12, 1894 (Low); Jenerk, Klutlan Glacier, elevation 5,500 feet, 141 Meridian, North of Mt. Natazhat, May 2, 1913 (Nesham).

In addition to the above localities the species has been recorded by Walker* from "St. Martin's Falls, Albany River, Hudson's Bay (Dr. Barnston)"; "Fort Confidence (Sir J. Richardson)"; by Grote† from "Yukon River, mouth of Porcupine River (R. Kennicott)"; and ‡ "Racine, Wis. (P. R. Hoy)"; and by Zeller†† from "Fort Resolution am Sklaven-see (Great Slave Lake) Westlich von der Hudson's Bay unter dem 61° N. Br. (Baron Osten Sacken).

*C. B. Mus. Het. XI, 702, 1857.

†Proc. Ent. Soc. Phil. III, 74, 1864.

‡Bull. Bkln, Ent. Soc. III, 30.

††Stett., Ent. Zeit. XXIV, 136.

NEW SPECIES OF MICROLEPIDOPTERA.

BY ANNETTE F. BRAUN, CINCINNATI, O.

Coptodisca magnella, n. sp.

Palpi and lower part of face silvery white; head with a decided pale golden lustre. Antennæ fuscous.

Thorax and basal half of fore wings pale silvery gray, almost white; extreme costa on basal half black. Apical half of fore wings golden yellow; a triangular silvery white spot at the apical third of the costa edged with black on both sides; a similar but narrower spot a little anterior on the dorsal margin, also edged with black on both sides. The outer edge of the dorsal spot forms part of the dark patch of scales which extend from it to the dorsum and termen. This patch is often pale gray and ill-defined, except at its outer edge, which is marked by a row of dark scales along the termen. It is separated from the dark margins of the costal silvery spot by the golden ground colour. Beyond the costal spot and almost parallel to its outer margin is a streak of black scales. Apical patch wedge-shaped, formed of a circular velvety black spot, and the terminal row of black scales immediately beyond it. It is preceded and edged on either side with one or two silvery white scales; and well separated from the dark dorsal patch by the golden yellow ground colour. Cilia whitish yellow, with an apical black pencil extending outward from the apical black patch. Hind wings gray.

Legs yellow, except the fore tibiae and all the tarsi, which are fuscous. Abdomen fuscous above, yellow beneath.

Expanse: 5-6 mm.

Nine specimens, Lancaster, Ohio, bred from mines on leaves of huckleberry, *Gaylussacia baccata* (Wang.) Koch. The mine is of the usual character in the genus, starting as a narrow linear mine which abruptly enlarges into a semitransparent blotch (10 by 3 or 4 mm.). The elliptical case is attached as usual by a silken band to a leaf or twig. Mines which were collected August 21, 1914, produced imagos May 10-17 of the following year.

This is the largest species of the genus thus far described. Apart from its size, it may be distinguished from other species chiefly by the pale basal half of the fore wings and the fact that the dark dorsal patch never extends nearer the costa than the apex of the dorsal silvery spot, and therefore the ground colour extends without interruption between the silvery spots to the termen beneath the apical spot.

It is most closely related, particularly in character of mine and shape of pupal case, to *C. ostryæfoliella* Clem., of which there seems to be no published description. To supply this the following brief description of *C. ostryæfoliella* is given.

***Coptodisca ostryæfoliella* Clemens.**

Antennæ fuscous; head with other appendages pale silvery gray.

Thorax and fore wings in the basal half pale silvery gray; apical half of fore wings yellow. At the apical third is a triangular silvery white spot dark margined on both sides. A little anterior on the dorsal margin, a similar but smaller and shorter spot narrowly separated from the costal spot by the ground colour or by the costal-wards and proximal extension of the dark dorsal patch lying beyond the dorsal white spot. This dark patch extends nearly or quite to the apical fan-shaped black spot, which is preceded and edged as usual by one or two silvery scales, and from which the usual black pencil extends outward into the cilia, which are whitish. Preceding the apex in the costal cilia is an almost perpendicular streak of black scales. Hind wings pale gray.

Abdomen gray above, silvery beneath. Legs silvery with dark fuscous tarsi.

Expanse: 4-4.2 mm.

Bucculatrix crescentella, n. sp.

Face whitish, tuft on the vertex whitish, more or less intermixed with ochreous or dark brown hairs.

Fore wings usually brown; sometimes paler, almost buffish ochreous. A whitish streak, sharply defined in dark specimens, extends from the base for one-half the wing length above the fold; immediately beneath the ground colour is somewhat darkened. At the middle of the costa is a narrow oblique curved white streak, concave outwardly; beyond it a less oblique white streak pointing toward the tornus; between these streaks the ground colour is a darker brown. On the middle of the dorsum is a half crescent-shaped dark brown spot, bordered before and behind with whitish. A triangular white spot immediately precedes the apex and lies above an irregular black spot, beyond which a line of dark scales crosses the apical cilia. Hind wings gray, brown or ochreous tinged.

Legs yellowish, marked with fuscous; hairs on posterior tibiae pale ochreous.

Expanse: 7-9 mm.

Described from a series of bred and captured specimens. This is one of the commonest species around Cincinnati; it occurs also at Toronto, Canada. Mines may be found plentifully on species of *Compositae* belonging to several genera (*Aster* spp., *Solidago* spp., *Erig. ron* spp.). The larva makes a trumpet-shaped mine, gradually increasing in diameter and marked by a central line of frass. On rare occasions it deserts one mine to form another, but is at no time an external feeder. The cocoon of the usual *Bucculatrix* type is a white elongate ribbed structure.

Lyonetia candida, n. sp.

Face, palpi and antennal eye-cap silvery white; antennal stalk gray. Tuft on the vertex white, with a few blackish hairs, especially behind.

Fore wings shining pure white, except in the apical part. Just before the costal cilia is an oblique triangular grayish streak, apparently formed by the confluence of two narrower streaks, which are sometimes indistinctly separated from one another by white ground colour. This is followed by three perpendicular, slightly curved black streaks in the cilia preceding the round black

apical dot. The last of these meets a similar black streak projecting into the cilia below the apex. The oblique triangular costal streak meets in the middle of the wing the apex of a grayish V-shaped mark placed at the tornus. The space between the arms of this mark is sometimes suffused with gray. A yellow patch occupies the apex of the wing and is margined along the termen by blackish scales. A black streak projecting out into the apical cilia from the apical dot is crossed at right angles by a nearly straight black line. Hind wings and cilia gray.

Abdomen gray, white beneath. Legs whitish, tarsal segments tipped with black.

Expanse: 9-10.5 mm.

Three specimens, Santa Cruz Big Trees, Calif., the larvæ mining leaves of Azalea, *Rhododendron occidentale* Gray, July 21; one specimen, Mt. Rainier, Wash., mining leaves of the white Rhododendron, *Rhododendron albiflorum* Hook., August 15. The imagos appeared August 4-7 and August 28.

The early long very narrow linear mine (3-4.5 mm.) abruptly enlarges into an irregular blotch. The pupa is enclosed in a slight white cocoon.

This species is nearest to *L. latistrigella* Wlsm., also a *Rhododendron* miner; but differs strikingly from it in the absence of the conspicuous curved black streak from the middle of the dorsum.

NOTES AND QUERIES.

NOTES ON SOME MISCELLANEOUS ECONOMIC INSECTS FOUND IN NEW JERSEY.

Calloplistria floridensis Guen. (Lep.). This insect, known as the Florida Fern-Cutworm, which has already been recorded by me as occurring in New Jersey (Canad. Ent., Jan. 1915), and doing considerable damage to ferns in greenhouses, was found to be effectively controlled by spraying with fresh pyrethrum, one ounce to one gallon of water, plus one half ounce of soap. One large fern grower in New Jersey applied the above spray once a week for five or six weeks and gained complete relief. Pyrethrum was also applied with a bellows, and similar results obtained. Mr. J. J. Davis, in the 27th Report of the State Entomologist of Illinois, advocates the use of this material, which is undoubtedly the best insecticide to use against this pest.

Phytomyza chrysanthemi Kowarz. (Dip.). In the 1909 list, "Insects of New Jersey," the Chrysanthemum Leaf Miner or Marguerite Fly, as it is also called, is recorded under the genus *Napomyza* from one locality. As a matter of fact, it is present every year in various greenhouses in northern New Jersey and does considerable damage to chrysanthemums. The larvæ mine the leaves, and the irregular whitish lines and blotches often take up an entire leaf surface. In addition to this disfigurement of the foliage, the size and number of flowers is often reduced. While nicotine solutions are effective against this insect (Sanders, J. G., A Remedy for Chrysanthemum Leaf Miner, Jour. Econ. Ent., vol. V, No. 6, p. 472), many greenhouse men persist in using the more or less unsatisfactory method of picking off and destroying infested leaves.

Oberea tripunctata Swederus. (Coleop.). Every year while inspecting nurseries it is customary to run across the work of the Dogwood twig-girdler. Smith, in "Insects of New Jersey," records it as occurring throughout the state. Its presence is detected by a withering of the leaves at the tip of the infested shoot. While it is undoubtedly widely distributed in New Jersey, it never, as a rule, occurs in sufficient numbers to do any considerable damage.

Hemichionaspis aspidistræ Sign. (Homop.). In many fern houses in New Jersey this scale insect assumes the importance of a first-class pest. It is also being continually introduced into many houses on aspidistra imported from Belgium. As a rule, it is found on the lower leaves of the ferns, and by its spotting in bad infestations often makes the plants more or less unsalable. Unfortunately there is no satisfactory remedy, and the insects are usually got rid of by pulling off and destroying infested leaves during the operation of repotting or turning over the stock.

Isosoma orchidearum Westw. (Hymen.). Known as the Cattleya Fly, this member of the *Chalcididae* is an important pest in practically all orchid houses in New Jersey where *Cattleya* species are grown. The adult deposits one or more eggs in the bud, and development and pupation takes place inside, the bud finally becoming more or less swollen. In some cases I have found as many as six larvæ in a single bud. While fumigation with nicotine extracts to kill the adults is recommended as being the most efficient

method of control, I have never met an orchid grower who practised it. Most of them prefer to cut off and destroy the infested buds. If this operation is kept up persistently by an experienced man, it is only a question of time until the insect is eradicated. The man, however, must be experienced in detecting the infestations, otherwise many healthy buds will be destroyed. Many growers become quite expert in this, and can distinguish at a glance between a healthy and infested bud, both of which will seem perfectly normal to the ordinary observer. This insect also is undoubtedly being continually introduced in orchids imported from South American countries.

Aphrophora parallela Say. (Homop.). During June, 1915, many pine trees in a nursery at Elizabeth were observed to be rather plentifully infested by the above spittle insect, the white frothy masses giving the trees the appearance of having been decorated for Christmas. No injury to the trees could be detected, but it was somewhat unusual to find them occurring in such comparatively large numbers. It was noticed after collecting the nymphs that their bodies shrunk in five or six hours to one-third of their normal size.

Cecidomyia resinicola O. S. (Dip.). During June, 1915, many characteristic whitish masses of pitch inhabited by numerous orange-coloured larvæ of the fly were observed on the undersides of pitch-pine branches in nurseries at Springfield and Elizabeth. They attracted considerable attention from the nurserymen on account of their noticeable numbers, but no apparent damage was being done.

Corythuca arcuata Say. (Hemip.). Every summer this lace bug and its curious groups of eggs, which resemble certain forms of fungi, may be found on the leaves of oaks and other trees in various parts of the state. As a rule, it receives very little attention, although some seasons it is abundant enough to cause a whitening and withering of the foliage. Some day when it transfers its affection from forest to lawn trees, it may rank as more of a pest.

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ASPIDIOTUS ULMI JOHNS.

I have taken this insect on the following host plants in Missouri: *Catalpa catalpa*; *Ulmus* sp.; *Ptelea trifoliata* and *Juglans nigra*.

The scales were in abundance on all except the wafer-ash (*Ptelea trifoliata*), being thickly crowded between and under the rough bark. On the wafer-ash, however, I found only a few isolated scales, and these were located near the extremities of the twigs, the *Ptelea* being only a shrub a few feet tall. I have found no references to this scale attacking either *Ptelea* or *Juglans*, and so I offer these two as new host plants of *A. ulmi*. The scales winter over as nearly full-grown adults.

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AN APPARENTLY NEW SPECIES OF PHALONIA.

BY WM. BARNES, M.D., AND J. MCDUNNOUGH, PH.D., DECATUR, ILL.

Among some material sent us for determination by the Bureau of Cereal and Forage Insect Investigation were specimens of a *Phalonid* bred by Mr. C. N. Ainslie at Elk Point, S. Dakota from *Spartinana michauxiana* in the stems of which the larvæ were boring, apparently along with those of *Tortrix clemensiana* Fern. since a specimen of this species was included under the same breeding number. As we can find no name applicable to this species, we describe it as new as follows:—

Phalonia spartinana, n. sp.

♂.—Head, thorax, and primaries pale ochreous, the latter shiny and immaculate with the exception of a minute dark dot at the end of the cell at the origin of vein 5 and another below the origin of vein 2; the costal margin at the basal half is dark brown; secondaries pale smoky, with whitish fringes. Beneath primaries deep smoky, with the exception of the pale costal margin and fringes; secondaries much as above. Expanse 20 mm.

♀.—Similar to the ♂ but larger and without the dark costal margin and dot below vein 2; secondaries without the smoky shade. Beneath the primaries are less smoky and more ochreous than in the ♂. Expanse 25 mm.

Types: 2 ♂'s, 1 ♀. Elk Point, S. Dakota (C. N. Ainslie). Coll. Barnes.

Related to *Phal. atomosana* Busck, but smaller, paler and lacking the sprinkling of brownish atoms characteristic of this species.

Mailed April 10th, 1916.