

MAYFLY NYMPHS (CLEMENS).

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THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Ontario Agricultural College, Guelph, is the scene from year to year of many notable gatherings. At the end of August there is to be a somewhat remarkable assembly, when the Entomological Society of Ontario holds its fiftieth annual meeting, at which a number of eminent entomologists are expected in celebration of the Jubilee. Scientific societies and institutions in many parts of the United States are sending delegates, and some are also coming from Great Britain. The Universities of Edinburgh and Manchester are to be represented, and also the Natural History Department of the British Museum, the venerable Linnæan Society of England and the Entomological Society of London and the Entomological Society of South London. Also delegates from entomological societies in various places. It is somewhat remarkable that the two men by whose efforts the Society was formed half a century ago are still in active work, and will be present at the meeting, namely, Dr. William Saunders, who established the experimental farms of the Dominion, and was for twenty-five years director, and Professor C. J. S. Bethune, of the Agricultural College, who is President of the Society for the current year. In addition to those referred to, there will, of course, be a large representation of Canadian entomologists from all parts of the Dominion. The meeting will begin on Wednesday, August 27th. During that afternoon the delegates will present their congratulatory addresses, and Dr. Saunders and President Bethune will give some reminiscences of the formation of the Society and its early days. That evening a social reception will be given to the visitors by President and Mrs. Creelman at their residence in the College. Thursday morning will be taken up with the reading of papers and addresses, and the afternoon in motor excursions in the neighbourhood or visits to the College buildings. On Thursday evening a public lecture will be given in Massey Hall.

On Friday, the 29th, the visitors will be taken to Grimsby and given an opportunity of seeing the results of economic work in the Niagara fruit district. As the Toronto National Exhibition will be going on that week, reduced railway fares will be available from many points to that city.—C. J. S. B.

NEW SPECIES AND NEW LIFE HISTORIES OF EPHEMERIDÆ OR MAYFLIES.

BY W. A. CLEMENS, TORONTO, ONT.

While at the Go Home Bay Biological Station on Georgian Bay, during the summer of 1912, I made a special study of the Ephemeridæ of that district, under the direction of Dr. E. M. Walker, to whom I am much indebted for advice and kindly criticism. A full account of the investigations will appear in the report of the Marine Biological Stations of Canada, this paper being confined chiefly to new species and new additions to the life-histories of several forms.

The work was carried on from May 25 to September 10, and consisted chiefly in the collecting and rearing of nymphs or larvæ. Collections were made in as varied localities as possible, as there are nymphs for almost every condition of fresh water. The nymphs were taken to the laboratory in jars or bottles of water, where they were examined under the binocular microscope and the species separated. A number of each species were then transferred to breeding jars, which consisted of glass vessels, fitted up as nearly as possible to the conditions in which the nymphs were found, and supplied with running water. Over the jars, wire cages were placed to catch the subimagos as they emerged. As the subimagos appeared, they were transferred to other vessels, where they were kept until the final moult, which usually took place in a day or two. The imagos were killed with potassium cyanide and then preserved dry or in alcohol. The subimago exuvial and final nymph sloughs were also preserved for future reference. In this way about 180 specimens were bred out during the summer. The following is a list of the forms taken:

August, 1913

- Subfamily: Ephemerinae
1. *Hexagenia bilineata* Say.
 2. *Ephemerella simulans* Walker.
- Subfamily: Heptageninae
1. *Heptagenia flavescens* Waish.
 2. " *lutea* sp. nov.
 3. " *fusca* sp. nov.
 4. " *tripunctata* Banks
 5. " *rubromaculata* sp. nov.
 6. " *luridipennis* Burm.
 7. " *canadensis* Walker
 8. " *frontalis* Banks.
 9. " sp.? (nymphs only).
 10. *Ecdyurus maculipennis* Walsh.
 11. " *lucidipennis* sp. nov.
 12. " *grandis* sp. nov.
- Subfamily: Baetinae
1. *Baetisca obesa* Walsh.
 2. *Leptophlebia*, sp.? (nymph only).
 3. *Blasturus cupidus* Say.
 4. *Blasturus nebulosus* Say.
 5. *Choroterpes* (?) *basalis* Banks.
 6. *Ephemerella lutulenta* sp. nov.
 7. *Ephemerella lineata* sp. nov.
 8. *Ephemerella bicolor* sp. nov.
 9. *Drunella* sp.? (nymph only).
 10. *Cænis diminuta* Walker.
 11. *Tricorythus allectus* Needham.
 12. *Chirotenetes albomanicatus* Needham.
 13. *Siphylurus flexus* sp. nov.
 14. *Baetis propinquus* Walsh.
 15. *Clæon dubium* Walsh.
 16. *Callibaetis ferrugineus* Walsh.

DESCRIPTIONS AND NOTES.

Genus HEPTAGENIA

Special attention was given to this genus on account of its abundance and the comparatively large number of species. The

nymphs of eight species were taken and imagos reared, three of which are new species and the nymphs of the other five have not previously been described. The Heptagenia nymphs were the dominant forms in the swift waters and along the exposed shore. Their bodies are very much flattened, legs spreading, femora flattened, claws pectinated, gills placed dorsally in an overlapping series, and eyes on dorsal surface of head, and so are adapted to a life in the swiftest water. They are able to cling very tightly, for when they are lifted from a stone, quite a resistance can be felt. The clinging habit is very strong, for if a number are placed in a vessel of water without anything else to cling to, they begin clinging to each other and are soon all in a mass. They are quite active and are able to scurry over the surface of a stone, even going sideways and backwards. Their food consists of the various algal forms on the stones to which they cling.

A Heptagenia probably completes its life cycle in a year. It spends all its life in the water except for four or five days as subimago and imago. The egg hatches in about 40 days. This calculation is based upon the fact that about two months after the appearance of the imagos of *H. tripunctata* the small nymphs of the next generation were found, and this is the time required for the eggs of *Hexagenia bilineata*. The nymphs moult about once every two weeks, and as the time of emergence approaches, they probably migrate into quieter water. I have not observed the emergence of a Heptagenia subimago in the open, but in the laboratory the nymphs would crawl up the sticks placed in the jars for the purpose and transform just above the water level. The subimago stage usually lasts a day, but occasionally only a few hours and in the early part of the season it frequently lasted three or four days. Temperature and humidity seemed to be important factors. The imagos commenced their flight shortly after sundown along the lake shore, dancing in their rhythmic up and down manner at a height of from 12 to 20 feet. The females deposited their eggs by flying over the surface of the water and brushing off the eggs into the water as they appeared from the openings of the oviducts. Of the eight species the first to appear was *H. tripunctata* about June 1, and the last, *H. luridipennis*, September 2.

There are two distinct groups. In the first, consisting of *H. tripunctata*, *H. luridipennis*, *H. flavescens*, *H. lutea*, *H. fusca*, *H. rubromaculata*, the nymphs are characterized by having the lamellæ of the gills oblong, claws usually pectinated, distal segment of maxillary palpus thickest about its middle and with a small tuft of bristles near its distal end. The body is much flattened and the colour olive brown or greenish yellow. The male imagos have the penis lobes rather L-shaped and the second and third tarsal segments of the fore legs are equal, while the fourth is about four-fifths the length of the second. In the other group, consisting of *H. canadensis*, *H. frontalis*, and a third undetermined species represented by the nymph only, the nymphs have the lamellæ of the gills oval and produced distally into a sharp point; the claws are not pectinated, the distal segment of the maxillary palpus thickest towards the distal end and the tuft of bristles larger than in group 1. The body is less flattened, more reddish or yellowish, and has the appearance of being striped longitudinally on dorsal surface of abdomen. The male imagos have the penis lobes oblong instead of L-shaped and the second and third tarsal segments are not quite equal, while the fourth segment is about half the length of the second.

The following keys will serve to separate these eight species:

Key to Male Imagos:

- A. No black spots or bands on face below antennæ. Group 1.
 - B. Very pale species.
 - C. Notum ferruginous, stigmal dots distinct..... *H. flavescens*.
 - CC. Notum lighter, no stigmal dots..... *H. lutea*.
 - BB. Dark species.
 - D. Large, entirely brown species.
 - E. Thorax with a broad dark median stripe or two narrow stripes close together..... *H. verticis*.
 - EE. Thorax without dark median stripe..... *H. fusca*.
 - DD. Not entirely brown.

- F. Two very small dots on median carina between antennæ *H. tripunctata*.
- FF. No dots on median carina; thorax and top of abdomen dark.
- G. Reddish area in pterostigmatic space of wing . . . *H. rubromaculata*.
- GG. Without reddish area in wing . . . *H. luridipennis*.
- AA. Two black spots or bands on face below antennæ. Group 2.
- H. A black band on face below antennæ, a dark dash in wing, abdomen dark. . *H. canadensis*.
- HH. A black spot on face below antennæ, no dash in wing, abdomen lighter. . *H. frontalis*.

Key to Nymphs :

- A. Gills oblong. Group 1.
- B. Nymphs entirely brown, without a distinct dorsal colour pattern.
- C. An inverted dark U-shaped mark on ventral surface of 9th segment and a dark spot on ventral surface of the 8th. Dorsal surface of body has a smooth appearance. *H. flavescens*.
- CC. A row of dark mushroom-shaped marks along ventral surface and a rectangular dark mark on 9th. Dorsal surface has a rather granular appearance and lateral margins of body quite hairy. *H. rubromaculata*.
- BB. Nymphs not entirely dark brown and have a distinct colour pattern.
- D. Ventral surface of abdominal segments banded with dark bands along posterior margins.
- E. Broad dark bands at posterior margin of each segment on dorsal surface. *H. fusca*.

EE. Dark bands at posterior margins of segments 7, 8, 9 and 10; not as broad as preceding species and a more elaborate colour pattern.....*H. lutea*.

DD. Ventral surface not banded.

F. Two rows of black dots along ventral surface of abdomen.....*H. tripunctata*.

FF. No dots.....*H. luridipennis*.

AA. Gills oval and pointed.

Group 2.

G. Two light longitudinal stripes on dorsal surface of abdomen close to median line.

H. Stripes fairly uniform for entire length.
Reddish species
....*H. canadensis*.

HH. The stripes not of uniform width, very wide on 8th segment, very narrow on 5, 6 and 7, so that darker intermediate parts have oval shapes. Lighter species.*H. frontalis*.

GG. Dorsal surface of abdomen has appearance of three longitudinal dark stripes. Colour greenish yellow.
H., sp. undetermined.

Mr. Nathan Banks kindly identified the imagos for me and loaned me specimens of *Heptagenia verticis*, *H. luridipennis* and *H. terminata*, for comparison.

Heptagenia flavescens, Walsh.

Nymph.

Measurements: Body 8-9 mm.; setae 10-13 mm. Head brown, very slightly covered with light dots; a light spot above each ocellus; a small light dot on each side of median ocellus; an irregular light area anterior and lateral to each eye. Pronotum brown, with two light spots on each side. Mesothorax similar in colour to prothorax. Abdomen of a uniform brown colour dorsally, having a smooth appearance; lighter ventrally, with a semicircular brown band on 9th segment and a median brown spot on 8th. Spines of lateral edge short. Setae banded, usually three segments dark and one light, sparsely fringed, usually only at base of light segment. Femora much flattened, brown and dotted with light spots, and having three irregular light bands; covered dorsally with small spines and posterior margin fringed with hairs and spines. Tibia with median and distal light bands. Tarsus tipped with white. Claws with two pectinations.

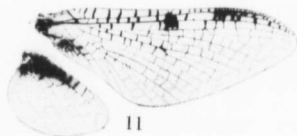
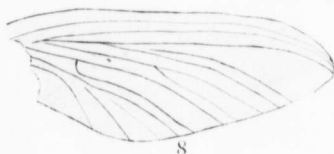
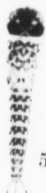
The nymphs of this species were taken up the Go-Home River on June 16, 1912, immediately above Flat Rock Falls, where the water was flowing swiftly but smoothly. They were clinging to stones in water one to one-and-a-half feet deep not far from the shore. On the same date they were found just below Sandy Gray Falls, two miles farther up the river. Here the water was swift and rough. I was successful in rearing only two specimens, the dates being June 27 and July 3.

Heptagenia lutea, sp. nov.

Male imago.

Measurements: Body, 9-10.5 mm.; wing, 10.5 mm.; setae, 20; fore leg, 10.

This is a light-coloured species, slightly reddish on face below antennae; reddish brown between ocelli and eyes. Thorax almost whitish yellow dorsally, light yellowish brown laterally; a dark area on each side of pronotum, slight red and brown markings below bases of fore and hind wings. Each abdominal segment 1-8 banded dorsally at posterior margin, remaining part of these segments being almost white; segments 9 and 10 entirely reddish brown; stigmal dots not marked; wings clouded in pterostigmatic



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space, a few cells reddish. Femora with median and apical bands; tibia-tarsal and tarsal joints black; fifth tarsus and ungues dark.

Female imago.

Measurements: Body, 11 mm.; wing, 12; setae, 22; abdomen more yellowish than male.

Nymph.

Measurements: Body, 10 mm.; setae, 13-16 mm. Head, light brown in colour and dotted with light dots; light areas over ocelli; another at posterior margin of head in median line and a larger one lateral to each eye. Pronotum with a broad, colourless lateral margin; remainder light brown, with numerous irregular light spots. Abdomen darker dorsally and with a rather complicated colour pattern. First segment light, with two brown areas at side; second with a narrow brown band along posterior margin and five brown areas and four light ones placed alternately; third almost entirely dark, with a few light dots; fourth with two dark spots in posterior lateral angles of segment, also a large dark area in centre of segment with a light area within it; fifth with a dark spot in each posterior lateral angle as in preceding segment, a dark band along posterior margin, two light areas surrounded with brown and a dark spot in centre of each; sixth almost entirely brown except for two light areas in anterior lateral angles; seventh with two large light areas, with a brown dot in each toward inner side; eighth an irregularly light and dark coloured segment; ninth has a narrow brown band along posterior margin and a dark longitudinal stripe in median line; tenth almost entirely dark. Ventrally, the lateral and posterior margins of segments 2-8 dark; segment nine with two large brown spots. Setae greenish; basal half well fringed at joints, distal half with each two segments alternately light and dark and few hairs at joinings. Femora with alternately light and dark irregular bands and covered with minute spines dorsally; posterior margins fringed with hairs, anterior margins also fringed, but hairs shorter. Proximal ends of tibiae dark and have dark bands slightly beyond middle. Tarsi with reddish-brown bands very near proximal ends. Claws with two pectinations.

These nymphs were very abundant along the open shore of Station Island and west of it, my collection dating from June 3 to July 2. A few were taken in a rapid on the Muskosh River on June

30 and several small specimens from Sandy Gray Falls, August 23. Imagos were reared from June 27 to July 3.

Heptagenia fusca, sp. nov.

Male imago.

Measurements: Body, 10 mm.; wing, 13; setae, 26; No markings on face; ocelli almost in a straight line, the middle one the smallest. Pronotum brown, slightly darker along the median line; mesothorax uniformly brown. Abdomen with posterior one-third of each segment of same brown colour as thorax and projections from this band anteriorly in the median line, almost forming a continuous longitudinal stripe on the abdomen; the band widens laterally also; remaining portions of each segment somewhat light brown; ventrally very slightly banded. Forceps and penis lobes of usual form. Femur banded in middle and at distal end. Wings large; costa, subcosta and radius light in colour, while remainder of longitudinal and the cross veins brown. No cloud in perostigmatic space.

Female imago.

Measurements: Body, 10-12 mm.; wing, 14 mm.; setae, 18; Quite similar to male, except that abdomen is considerably darker.

Nymph.

Measurements: Body, 12-14 mm.; setae, 15-20; antennae, 3. Head brown, dotted with light spots; usually three light areas at posterior margin between eyes and two lateral to each eye; anterior margin well fringed with hairs. A light longitudinal median line on pronotum; two light areas on each side and lateral margin colourless; remainder of pronotum brown, with small light dots. Posterior one-third of each abdominal segment 6-10 almost black; segments 1-6 brown; the remainder of each segment varying from light brown to greenish yellow; ventrally posterior one-fourth of each segment 2-8 brown; ninth segment has two dark areas laterally. Femur light brown on upper surface, with a few lighter areas and covered with minute spines dorsally; posterior margin fringed with hairs; proximal end of tibia dark brown and its third quarter dark; proximal half of tarsus dark. Setae well fringed with hairs at the joinings.

While on a canoe trip up the Go-Home River, June 16th, I collected a number of the nymphs of this species just below Sandy

Gray Falls. The only imagos I have are those bred from this collection. The dates of emergence are June 23rd and 24th.

This species is close to *H. verticis*, but lacks the dark median stripe on the thorax, and does not show the slightest trace of a dash in the wing under the bulla.

Heptagenia tripunctata, Banks.

Nymph.

Measurements: Body, 11-14 mm.; setae, 12-16. Head deep brown, occasionally almost dark dotted with light spots; three light spots; three light areas along anterior margin of head and one at posterior margin between eyes. Pronotum similar in colour to head, with light dots and about five larger light areas on each side; lateral with a light area which extends inwards some distance. A light area in antero-lateral angle of mesothorax. Femur stout, with five irregular light areas; small spines very numerous; posterior margin fringed with hairs. Tibia with two dark and two light areas, arranged alternately. Abdomen similar in colour to head and thorax; a light area on segments 4 and 5 containing a small triangular dark area at anterior margin of segment 5, lateral to which are two dark dots; another light area on segments 7, 8, 9 and 10 containing two dark dots on 8th and two on 9th segments; usually three small dark dots at posterior margin of each segment. Ventrally two longitudinal rows of dark dots, increasing slightly in size toward posterior end; segment 9 usually with two pairs, the anterior pair small, posterior pair larger. Setae with alternate dark and light areas. Gills have the lamellae slightly rounded at distal end.

The nymphs of this species were seldom found in swift water, but were everywhere abundant about Go-Home Bay, in quiet bays, along open shores and in quiet streams. They could be found at any time during the summer. The first bred specimens emerged May 31, but the first capture was not made until June 11. On this date a small swarm of about 20 individuals was discovered about 8.15 p.m. flying from 10 to 20 feet high along the shore of Station Island, facing north. One female and several males were taken. Soon after this they became very abundant and remained so until about July 5th. The last bred specimen is dated Aug. 13.

Heptagenia rubromaculata, sp. nov.

Male imago.

Measurements: Body 8 mm.; wing 8; setæ 17; fore leg 7. No markings on face; darker spot at posterior margin of head between eyes. Thorax dark; median longitudinal dark stripe on pronotum; dark brown stripe on coxa of fore leg and extending up the side of prothorax. Abdominal segments 1-7 light; 8-10 dark, similar to thorax; each segment banded at posterior margin; stigmal dots distinct; wing has a reddish area in pterostigmatic space.

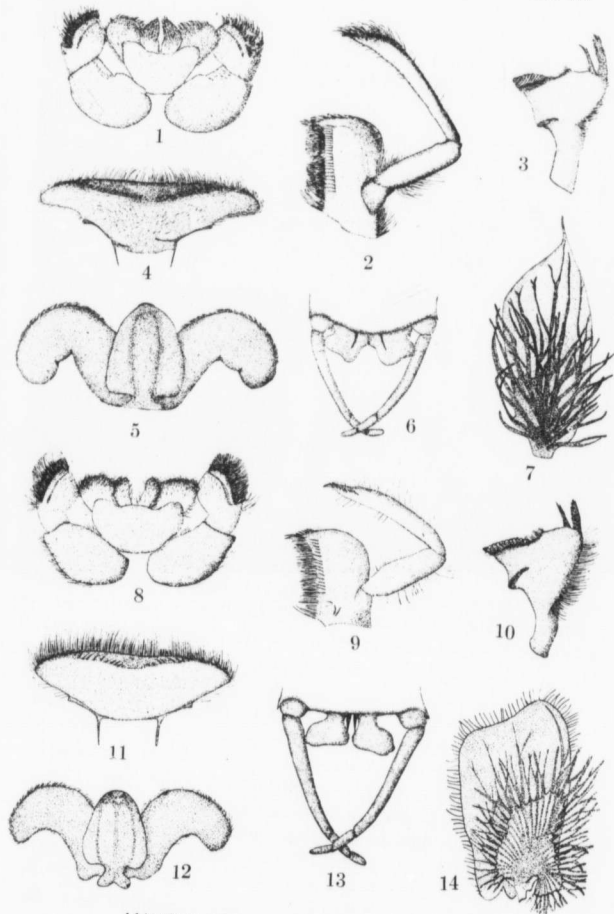
Female imago.

Measurements: Body 9-9.5 mm.; wing 13-14; setæ 15-22; often slightly reddish on face beneath antennæ. Dark brown on dorsal surface of head behind ocelli. Abdomen varies from reddish to a yellowish colour in dried specimens.

Nymph.

Measurements: Body 9-10 mm.; setæ 10. Head dark brown, dotted with minute light spots. Pronotum similar in colour to head; two light areas on each side, the outer one sometimes joined to the light margin. Abdomen dark brown, with a granular appearance; sometimes a faint, broad, dark, longitudinal streak can be made out with two dots on each side of it on each segment excepting 9 and 10; ventral surface lighter, with a median row of irregular dark spots and lateral rows of small dots or lines; the median dots are sometimes broken up so that only four or five small dots remain in its place; on segment 9 the markings are usually joined, forming roughly three sides of a square. Femur with four irregular dark bands; both posterior and anterior margins very hairy; claws pectinated. A very hairy species, having anterior margin of head, sides of thorax and abdomen very hairy.

This nymph was first taken on June 15 in what is commonly called the Narrows, near the mouth of the Go-Home River. The water here had a well-marked current, but not swift. On June 30 I found them very numerous in the very swift water of a rapids near the mouth of the Muskosh River. Nearly a month after this, on July 20th and 22nd, I discovered mature nymphs at an old lumber chute on the Go-Home River in fairly swift water. Imagos were bred from the nymphs taken at the Narrows on June 22nd and



MAYFLY STRUCTURE (CLEMENS).

25th; in the Muskosh Rapids from July 3rd to 5th, and at the Chutes, July 24-29th.

Heptagenia luridipennis, Burm.

Nymph.

Measurements: Body 7-8.5 mm.; setae 10-14. Head brown, with light dots; anterior margin fringed with hairs. Prothorax similar in colour to head; on pronotum a light spot on each side of median line; lateral to this another larger one, and lateral to this another which extends to the lateral margin. Abdomen similar in colour to prothorax; a row of black dots on each side corresponding to the stigmal dots of imago; segment 3 for the most part light, with a round brown spot in the median line and with two short projections laterally; segment 4 with a small triangular brown spot in median line with base to anterior margin, while apex meets a large brown area, leaving a small light area on each side of triangle; lateral to the brown area is a light one, and lateral to this again is a triangular dark spot in the posterior angle of the segment; segment 5 much like the 4th; segment 6 entirely dark, except for two small spots at anterior margin and two toward lateral margin; segment 7 with a triangular dark spot in median line, with base to anterior margin and apex reaching about middle of segment; on each side of triangle two dark spots; segment 8 similar to the 6th; segment 9 irregularly marked; roughly, it is dark, with a darker median longitudinal line, two light spots on each side and another at lateral margin; segment 10 entirely dark; ventrally there are two dark spots at lateral margins of 9th segment, just beside the lateral spines of that segment; sometimes a triangular spot in median line also. Setae with basal half fringed with hairs.

This was the last species to be taken. On August 23rd I found them in a rapid just above Sandy Gray Falls, where the river flows through a small gorge. I was successful in rearing quite a number of imagos, dating from August 28th to September 1st. These are slightly smaller than those Mr. Banks sent me and considerably smaller than the measurements given in various descriptions.

Heptagenia canadensis, Walker.

Nymph.

Measurements: Body 11 mm.; setae 15; antennae 3.5. Head reddish brown in colour; a small dark area immediately in front of

each antenna, and another about the same size in front of each eye, a black dot behind each lateral ocellus; a light area in front of median ocellus, and a larger light area between each lateral ocellus and eye; another lateral to each eye along margin of head. Mouth parts of the type belonging to group 2. Pronotum reddish brown, with a dark and an approximate light area in each lateral half; margin colourless. Abdomen darker than thorax; each segment with four light longitudinal streaks, two near median line and the other two near lateral margin; black dots, corresponding to the stigmal dots just inside the lateral light streaks. Ventrally the abdomen is almost white, each segment has two light brown lateral streaks, while the 9th has its lateral and posterior margins margined with light brown. Short lateral spines at posterior lateral angles of segments 8 and 9. Setae of equal length; light brown in colour; joinings fringed with hair. Gills oval and pointed. Femur of fore leg light brown, with four light areas; two small ones toward anterior margin and two large ones toward posterior; distal end light coloured. Femora of hind legs with fewer pale markings. Tibiae alternately banded with brown and white; tarsi have very broad median bands; legs slightly hairy along posterior margin.

This species was very abundant at Go-Home Bay, being next in numbers to *H. tripunctata*. The nymphs were taken from May 25th to July 10th in various localities, but never in swift water, the usual place being quiet bays. Small nymphs of the next generation were found on September 5th. The first bred specimen is dated June 1st and the last July 4th. Imagos were most abundant at Station Island from June 25th to July 15th.

Heptagenia frontalis, Banks.

Nymph.

Measurements: Body 9-10 mm.; setae 9-10; Head yellowish brown in colour; three almost round light spots along anterior margin of head; usually a light area in front of each ocellus, and another along median line between eyes and two smaller ones lateral to this along posterior margin of head. A black dot below each antenna, in front of each eye and near inner margin of each eye. Thorax lighter in colour than head; on each side of pronotum, near median line, is a small light spot; just lateral to this is a

triangular dark spot, and lateral to this again is another light area; in anterior angle of pronotum is an oval light spot; along posterior margin extending some distance on either side of median line is a broad light band, which is connected by a light longitudinal stripe along median line of mesonotum to a large irregular light area on the mesonotum. Abdomen usually a light yellowish brown; the colour pattern roughly has the appearance of a broad light band along median line, in which in segments 5, 6 and 7 are oval dark areas; in 8, a narrow stripe, and in 9 a round, dark area in each segment; on either side of this broad light band is a short light stripe; ventral surface almost white, with two lateral light brown longitudinal stripes on segments 1-9; a broad band across 9th along posterior margin, joining the two lateral stripes. Segments of setæ alternately light and brown. Legs pale, colour pattern similar to *H. canadensis*.

This species was not nearly so abundant as *H. canadensis*. The nymphs were taken in similar localities, but were not so widespread or plentiful. They were found from July 15th to July 2nd and imagos were reared from June 26th to July 4th.

Heptagenia? (undetermined).

Nymph.

Measurements: Body, 10-11 mm.; setæ, 12-13.; head, light brown; sometimes three light areas along anterior margin, but frequently the middle one is lacking and the two lateral ones are connected with the light margins lateral to the eyes. An almost black spot in centre of each half of pronotum; around this is an irregular light area, exterior to which is a brown area. Abdomen whitish yellow, with five longitudinal yellowish brown stripes in each segment 1-8. Setæ light greenish yellow; joints abundantly fringed with hairs. Legs yellowish brown in colour; pattern similar to the two preceding species.

These nymphs were collected along the east shore of Manitoulin Island on June 26th, 1912, by Mr. R. P. Wodehouse, who kindly handed them over to me. As imagos were not reared, the species cannot be determined at present.

EXPLANATION OF PLATES.

PLATE V.

Photographs of Mayfly Nymphs.

- Fig. 1. *Heptagenia tripunctata* Banks.
 Fig. 2. *Heptagenia lutea* sp. nov.
 Fig. 3. *Heptagenia canadensis* Walker.
 Fig. 4. *Heptagenia* sp ?
 Fig. 5. *Heptagenia frontalis* Banks.
 Fig. 6. *Heptagenia rubromaculata* sp. nov.
 Fig. 7. *Heptagenia fusca* sp. nov.
 Fig. 8. *Heptagenia flavescens* Walsh.
 Fig. 9. *Heptagenia flavescens* (ventral view).
 Fig. 10. *Ecdyurus pullus* sp. nov.
 Fig. 11. *Ephemerella lineata* sp. nov.

PLATE VI.

- Fig. 1. Nymph *Hexagenia bilineata* Say.
 Fig. 2. Nymph *Heptagenia luridipennis* Burm.
 Fig. 3. Nymph *Ephemerella bicolor* sp. nov.
 Fig. 4. *Ecdyurus maculipennis* Walsh.
 Fig. 5. Nymph *Ecdyurus lucidipennis*, sp. nov.
 Fig. 6. Nymph *Batis propinquus* Walsh.
 Fig. 7. Nymph *Cloeon dubium* Walsh.
 Fig. 8. Venation of wing pad of nymph of *Siphylurus flexus* sp. nov.
 Fig. 9. Fore claw of nymph of *S. flexus* sp. nov.
 Fig. 10. Fore claws of imago of *S. flexus* sp. nov.
 Fig. 11. Wings of *Siphylurus flexus* sp. nov.

PLATE VII.

Mouth parts, gills and genitalia of *Heptagenia canadensis* and *H. tripunctata*.

- Fig. 1. Labium and 2nd maxilla, *H. canadensis*.
 Fig. 2. First maxilla, *H. canadensis*.
 Fig. 3. Mandible, *H. canadensis*.
 Fig. 4. Labrum, *H. canadensis*.
 Fig. 5. Hypopharynx, *H. canadensis*.
 Fig. 6. Genitalia, *H. canadensis*.

- Fig. 7. Gill, *H. canadensis*.
Fig. 8. Labium and 2nd maxilla, *H. tripunctata*.
Fig. 9. First maxilla, *H. tripunctata*.
Fig. 10. Mandible, *H. tripunctata*.
Fig. 11. Labrum, *H. tripunctata*.
Fig. 12. *Hypopharynx*, *H. tripunctata*.
Fig. 13. Genitalia, *H. tripunctata*.
Fig. 14. Gill, *H. tripunctata*.

(TO BE CONTINUED.)

A JUMPING MAGGOT WHICH LIVES IN CACTUS
BLOOMS (*ACUCULA SALTANS*, GEN.
ET SP. NOV.).

BY CHARLES H. T. TOWNSEND,
Director of Entomological Stations, Lima, Peru.

On January 25, 1913, the writer was exploring a rocky draw among the bare hills in the western base of the Andes, above Santa Ana ranch house, about forty miles inland from Lima, and at about 4,000 feet elevation above sea. In this draw a columnar cactus was found growing in bunches, probably *Cereus* sp., which at that date showed few blooms opened, but many unopened buds. One large bud evidently past opening time, and in reality a bloom whose opening had been prevented by the shrivelling of the petals which effectually closed it, was cut open and disclosed five maggots that possess the power of jumping six or eight inches high from a hard surface. The cactus buds were all numerously attended by a large brown ant, specimens of which have been sent to Dr. Wheeler for determination, and the closed bloom containing the maggots was simply massed with the ants on the outside, much more so than the buds in general, yet no entrance had been effected by them into this bloom. The bloom was cut open with the idea that the ants were inhabiting it, and thus the discovery of the maggots was purely accidental. The maggots were found to be boring among the clogged mass of stamens and anthers. Fermentation of the mass was evident from the sour odour, but no actual putrefaction had taken place. The maggots had not penetrated the septum covering the

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ovarial chamber, and the developing seeds appeared to be in normal condition.

Description of Third-stage Maggot.—Length, extended, 9 to 10 mm. Pale yellowish or straw-colored, anal plates and cephalopharyngeal skeleton black. Mandibular hook double, not coalesced. Anal plate in one transverse piece of chitin, with a sharp spine pointed upward from each end. Anal stigmata situated one on each side in end of anal plate next to and just inside of the spine. At outer end of anal plate on each side is a chitinous black ocellus. Ventral surface of body has spinose areas at junction of segments, being eleven half rings of microscopic spines, the front one faint and situated opposite the pharyngeal sclerites, the hind one on the subanal proleg-like hump or tubercle. Dorsum of body without spines or spine areas. Thirteen segments appear marked by integumental divisions, and counting the apparent second segment as II. and III. the total is fourteen, XIII carrying the subanal tubercle and XIV. the anal plate, though the last is small and ill-defined.

The maggot jumps by curling the body until the head and anal plate meet, the mandibular hook being appressed ventrally to the dorsal surface of the anal plate, whose lateral hooks are dorsally directed, the anal plate being then forcibly thrust free from the mandibular hook by a sudden and rigid straightening of the body from the anal end, while the mandibular hook is maintained continuously at resistant tension. This produces the leap, probably after the same manner as in the maggot of *Piophilus*. While the body is curled, the ventral surface represents the concavity and the dorsal the convexity of the curve assumed. Probably this jumping power of the maggot has been developed for the purpose of escaping the ants or other enemies when the flower is abandoned for pupation in the soil.

On January 26 the maggots were found to have issued from the bloom. Soil was supplied to three of them, into which two of them immediately entered, but the third had already begun to contract for pupation and remained on the surface. Issuance had not taken place up to some fifteen or twenty days after, but on February 27 the three flies were found issued, perfectly transformed, and dead. The pupational period is evidently close to

three weeks. The fly is of unusual interest on account of the long and extremely needle-like ovipositor of the female.

ACUCULA, gen. nov.

Head flattened or shortened-subhemispherical, in form approaching that of *Milichia*, but longitudinal axis less. Front of male about three-fifths of eye-width, that of female about eye-width. A pair of reclinate and slightly convergent vertical bristles, a pair of reclinate orbitals in front of ocelli, a pair of proclinate ocellar bristles, these all being equal in strength and length; rest of parafrontals with fine hairs half the length of the bristles. Antennæ inserted below eye-middle, reaching about three-fifths way to oral margin, third joint somewhat elongate, arista short-pubescent. Peristomalialia with five or six equal bristles, the vibrissæ not differentiated. Eyes descending to lower margin of head in profile, the cheeks narrow. Proboscis and palpi short, not exerted, the oral cavity rather pronounced.

Mesoscutum with bristles near posterior border only, short hairs on rest; scutellum subtriangular but rounded apically, bearing a pair of apical and a pair of lateral bristles slightly longer than those of mesoscutum. Abdomen broad in both sexes, as broad as, or slightly broader than, the thorax, suddenly narrowed at base; oblong and flattened in male, slightly arched in female, but also flattened and shortened-subrounded rapidly tapering apically. Male hypopygium rather small. Ovipositor three-jointed; the basal joint widened and flattened, about as long as basal width; second and third joints equal and twice as long as basal or nearly that, the second a little wider than thick, the third filiform needle-like, with microscopically sharply-pointed tip and evidently telescoping within second joint; whole ovipositor conspicuously longer than female abdomen, but about as long as abdomen of male. Legs short, normal in both sexes; the hind metatarsi a little elongate, middle and front ones successively less so; middle tibiæ with very weak short apical bristle. Auxiliary vein coalesced with first vein throughout, latter ending a little before small crossvein; apical cell not narrowed, second basal and anal cells distinct; hind crossvein about half way between small crossvein and point where

fourth vein reaches wing margin; a slight emargination of costa at end of first vein.

Type: *Acucula saltans*, n. sp.

Acucula saltans, n. sp.

Length of body of male, 5 mm.; body of female to end of extended ovipositor (axis of abdomen and ovipositor flexed to axis of thorax), 7 mm.; ovipositor, 3 mm.; wing, 4 to 4.5 mm.. Two males and one female reared from maggots found in cactus bloom at Santa Ana, Rio Rimac Valley, Peru, about 4,000 ft.

Wholly bluish-greenish black, polished, metallic; eyes, face and antennæ brown; face slightly cinerous in oblique lights; legs brown, tibiæ tawny or obscure yellowish. Wings clear, tawny whitish at base.

The eggs are evidently deposited within the cactus bud at a certain stage of development of the latter, the elongated needle-like ovipositor being used for piercing the wall of the bud. The maggots evidently feed on the fermenting juices of the flower mass, whose development is arrested by their presence.

This fly appears to be intermediate between the Milichiidae and the *Sepsidae*, partaking largely of the characters of both. The head, abdomen, wings, legs and vibrissæ are more like *Milichia*; while the frontal characters and larval habits are more like *Sepsis*. The larval saltatory habit finds its only known counterpart in *Piophila*. The fly is probably to be considered an aberrant member of the *Sepsidae*, certainly so if the saltatory habit signifies anything.

OVIPOSITION HABITS OF *CULEX ABOMINATOR* DYAR AND KNAB.

BY B. R. COAD, WASHINGTON, D.C.

To the best of the writer's knowledge, the oviposition habits of *Culex abominator* have not been published, and, as they are unique for a species of *Culex*, they are perhaps worthy of note.

The larvæ of this species are indigenous to the beds of aquatic vegetation which frequently form in the rivers and lakes of the north-central states. These beds are composed of *Ceratophyllum*, *Potamogeton*, *Lemna* and similar aquatic plants. This growth is more or less impervious to fish, but provides sufficient open water surface to allow the breeding of great numbers of mosquitoes.

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The eggs of *abominator* are laid on the upper surface of Lemna fronds in rather large masses. In only one instance were the eggs found on any other plant, and in this case they were on the edge of a Potamogeton leaf which was floating on the water. They are quite firmly attached to the frond and to each other. The base of



FIG. 10.—Egg masses *Culex abominator*.

the egg is truncate, facilitating a firm attachment. The eggs are very black and the masses show up distinctly in contrast with the green of the frond. They are always near the margin of the frond and, upon hatching, the young larvæ immediately wriggle off into the water.

The usual appearance of the mass is shown in the accompanying photograph, thanks for which are due Mr. H. P. Wood.

The writer made these observations while working on the mosquitoes at Havana, Illinois, in the employ of Dr. S. A. Forbes, and this note is published with his kind permission.

NOTES ON SOME COLEOPTERA OF THE OKANAGAN VALLEY.

BY E. P. VENABLES, VERNON, B.C.

In preparing the following list, I am fully aware that many of the observations and records may not be new. But as some years have been spent by the writer in collecting and recording, as opportunity has offered, insects of the Vernon district, there will no doubt be found among the species given some records of interest from the standpoint of geographical distribution. The Okanagan Valley, at Vernon, has an elevation of 1250 feet and it is at this point that all the material has been taken. Vernon is situated in what is known as the dry belt of B.C.

The summers are, as a rule, somewhat dry and irrigation is a necessity. During March and April there is, as a general rule, no rain to speak of beyond a few showers, and the months of May and June are what may be called in this district the wet months. From the middle of June to the middle of September the weather is very warm and bright. The snowfall begins at the end of November, and there is in most seasons a foot or more on the ground, which does not disappear until early in March.

The dates when given are those on the labels of the specimens and are not meant to show the period of activity of the species. This can, of course, only be done after many seasons of careful observation and accurate note-keeping.

I have not worked to any extent in the Carabidæ; hence the small number of species given. It is hoped to present lists of other families from time to time.

CICINDELIDÆ.

Cicindela longilabris Say.—IV. 04, V. 05, VIII. 08.

purpurea Oliv.—Rare, I. IV. 04.

vulgaris Say.—Very common in sandy places.

oregona Lec.—Another abundant species found on the shores of Long Lake.

imperfecta Lec.—Not commonly observed, V. 04.

CARABIDÆ.

Cychnus marginatus Fisch.—Found in rotten stumps, fairly numerous.

angusticollis Fisch.—Only one specimen.

- Carabus tædatus* Fab.—A common species to be found in the spring under dead leaves, etc.
serratus Say.—Numerous at all times.
- Calosoma calidum* Fab.—Very common.
subæneum Chd.
- Elaphrus riparius* Linn.—Taken in numbers on damp beaches, VIII.
- Opisthius richardsoni* Kby.—Taken under logs in August.
- Nebria gebleri* Dej.
sahlbergi Fisch.
- Bembidium bifossulatum* Lec.—III. 07; IV 06.
planatum Lec.—VIII. 05.
- Bembidium transversale* Dei.—Taken under leaves in spring.
lucidum Lec.—Numerous at all times in loose soil.
pictum Lec.—Fairly common.
nigripes Kirby.
4-fossulatum Mann.
- Patrobus longicornis* Say.—Taken under stones near water.
- Pterostichus validus* Dej.—Common under stones.
riparius Dej.—V.
- Amara latior* Kirby.—An abundant species during the whole year.
californica Dej.—Fairly common.
- Badister pulchellus* Lec.—Found under leaves in woods.
- Platynus cupripennis* Say.—Not common, taken in November and April.
subsericeus Lec.
obsoletus Say.
sordens Kirby.
gemellus Lec.
- Lebia viridis* Say.—Taken on low bushes in May.
- Cimindis planipennis* Lec.—Found under stones.
- Chlænienus sericeus* Forst.—Under stones near water.
pennsylvanicus Say.—Taken in May and November.
- Harpalus computatus* Say.—Not numerous.
fraternus Lec.
- Stenolopus conjunctus* Say.—March and April.
- Tachycellus badiipennis* Hald.

SOME BEES FROM NEW BRUNSWICK, WITH DESCRIPTION OF A NEW SPECIES OF *HERIADES*.

BY J. C. CRAWFORD, WASHINGTON, D.C.

While collecting Ichneumonoidea in New Brunswick, Mr. A. Gordon Leavitt also collected a number of other Hymenoptera, and below is given a report on most of the Apoidea. Some of the material, mostly Megachilinae, Sphecodes and male Halictus, has not been identified, and is not included. A few of the determinations were made by Mr. H. L. Viereck, and credit is given in the proper places.

Owing to our scanty knowledge of the bees of Canada in general, the exact dates, sexes and number of individuals determined have been recorded.

Bombus fervidus Fabricus.

Nerepis, July 19, 22, two females; July 19, 22, 24, Aug. 22, five workers; Aug. 19, two males.

St. John, July 14, two females; July 14, 18, Sept. 23, three workers; Sept. 23, one male.

Red Head, St. John, Sept. 1, five workers, one male.

Bombus ternarius Say.

St. John, July 14, one female; Sept. 23, two workers; Aug. 19, Sept. 23, three males.

Nerepis, Aug. 18, 19, 22, Sept. 8, 9, twenty-seven workers.

Douglas Harbor, Grand Lake, Aug. 14, one worker.

Red Head, St. John, Sept. 1, one worker.

Bombus terricola Kirby.

St. John, Oct. 3, one female; July 14, one worker; Sept. 23, one male.

Nerepis, July 24, Aug. 18, 19, five workers; Aug. 18, one male.

Red Head, St. John, Sept. 1, one worker.

Bombus vagans Smith.

St. John, July 14, one female; Oct. 3, one worker; Sept. 23, to Oct. 3, three males

Nerepis, July 22, one female; Aug. 18, 19, Sept. 9, five workers; Sept. 8, one male.

Psithyrus ashtoni Cresson.

St. John, Oct. 2, one male.

Red Head, St. John, Sept. 1, one male.

Psithyrus insularis Smith.

St. John, Oct. 3, one female.

Nerepis, July 19, Sept. 8, two females.

Red Head, St. John, Sept. 1, one female.

Psithyrus laboriosus Fabricius.

Nerepis, Aug. 18, 19, Sept. 9, five males.

Clisodon terminalis Cresson.

Nerepis, Aug. 19, one female.

Stelis foederalis Cresson.

Nerepis, July 18, Aug. 18, two females.

Macropis morsei Robertson.

Nerepis, July 24, Aug. 19, six males; July 24, two females.

Alcidamea producta Cresson.

Nerepis, July 18, 22, two males; July 18, 24, Aug. 18, 20, 22, seven females.

Heriades carinatum Cresson.

Nerepis, Aug. 19, one male; Aug. 22, one female.

St. John, Sept. 9, one female.

Heriades leavitti, new species.

Male.—Length, about 5 mm. Black, with white pubescence, head and thorax closely and very coarsely punctured; face rugoso-punctate, the sides of face and clypeus almost concealed by the pubescence; second joint of antennæ subquadrate, the third, along its shortest side, not as long as broad; antennæ beneath dull reddish; wings brown; legs dark, obscurely reddish; abdomen coarsely and closely punctured, the punctures finer than those on thorax; the punctures on segments 1-3 hardly half a puncture width apart; segment four apically and 5 and 6 rugoso-punctured; 1st ventral segment elongate, medially at apex pointed, at base without a median elevation.

Habitat: Nerepis, New Brunswick.

Described from two specimens collected Aug. 22, by Mr. A. Gordon Leavitt, after whom it is named.

Type Cat. No. 16069 U. S. N. M.

This species resembles *H. carinatum*, but is smaller; lacks the projection at the base of the first ventral segment, has this sclerite elongate instead of short and truncate at apex medially, and has the first three dorsal abdominal segments more closely punctured, etc.

Osmia atriventris Cresson.

Nerepis, Aug. 18, 20, 22, seven females.

Osmia melanotricha Lovell & Cockerell.

Nerepis, Aug. 20, 22, four females.

As represented by this series, in this region the present species is larger than the preceding.

Megachile fragilis Cresson.

Nerepis, July 19, one female. Det. by Mr. Viereck.

Megachile melanophæa Smith.

Nerepis, July 19, 22, Aug. 18, 22, fifteen males. Det. by Mr. Viereck.

Megachile vidua Smith.

Nerepis, July 19, 22, Aug. 22, five females; July 22, one male.
St. John, July 14, four females; July 14, one male. Det. by Mr. Viereck.

Perdita octomaculata Say.

St. John, Sept. 9, one female.

Panurginus asteris Robertson.

St. John, Sept. 9, three males; Sept. 8, 9, ten females.

Nerepis, Aug. 18, 19, 22, twenty males; Aug. 18, Sept. 8, four females. Det. by Mr. Viereck.

Calliopsis andreniformis Smith.

Nerepis, Aug. 20, 22, four females; July 24, Aug. 20, 22, five males.

Augochlora confusa Robertson.

Nerepis, July 24, Aug. 19, two females; Aug. 22, one male.

St. John, Sept. 9, six females; Sept. 8, 9, four males.

Halictus albipennis Robertson.

St. John, Sept. 9, three females.

Nerepis, July 22, one female.

Halictus arcuatus parvus Lovell.

St. John, Sept. 8, two females; Sept. 8, 9, 18, twenty males.

Nerepis, Sept. 9, one female; Sept. 8, 9, six males.

Halictus coriaceus Smith.

St. John, Sept. 9, Oct. 3, two males.

Nerepis, Sept. 8, one female; Sept. 8, 9, four males.

Halictus craterus Lovell.

Nerepis, July 18, Aug. 18, 19, three females; Aug. 19, one male.
 St. John, July 14, Sept. 8, 15, 18; Oct. 3, six females; Sept. 8,
 9, 18, Oct. 2, 3, ten males.

Halictus cressoni Robertson.

St. John, Sept. 9, Oct. 3, two females; Sept. 9, one male.
 Nerepis, July 18, one female.

Halictus lerouxii Lepelletier.

St. John, Sept. 8, Oct. 3, two males.
 Nerepis, Aug. 18, one male •

Halictus oblongus Lovell.

St. John, July 18, Sept. 8, 15, Oct. 3, six females.
 Nerepis, July 22, Aug. 19, two females.

Halictus pilosus leucomus Lovell.

St. John, Sept. 8, one female.
 Nerepis, July 22, Aug. 19, two females; Aug. 18, three males.

Halictus provancheri Dalla Torre.

St. John, Sept. 8, 9, nineteen females; Sept. 8, 9, five males.
 Nerepis, July 18, Aug. 18, three females; July 22, Aug. 18, 20,
 22, ten males.

Halictus versans Lovell.

St. John, July 14, 18, seven females.
 Nerepis, Aug. 19, one female.

Andrena canadensis Dalla Torre.

Nerepis, Sept. 8, 9, two females. Det. by Mr. Viereck.

Andrena cratagi Robertson.

Nerepis, July 22, 24, three females. Det. by Mr. Viereck.

Prosopis basalis Smith.

Nerepis, Aug. 18, one female.

Prosopis cressoni Cockerell.

St. John, Sept. 8, one male.

Prosopis modestus Say.

With yellow spots on collar: St. John, July 18, two males.
 Nerepis, July 22, two males.
 Without yellow on collar: St. John, July 14, 18, six males.
 Nerepis, July 11, 22, 24, Aug. 18, nine males.

Prosopis varifrons Cresson.

St. John, July 18, two males.

Nerepis, Aug. 18, 19, two females.

Prosopis zizia Robertson.

Nerepis, July 22, Aug. 19, two males.

THREE NEW NORTH AMERICAN DIPTERA.

BY J. R. MALLOCH, BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

Chatoneurophora macateeii, new species.

Male: Black, shining, but not glossy. Palpi and legs more or less brownish. Halteres black.

Frons about one and two-thirds as wide as its length at centre; lower row of bristles convex; surface with numerous short hairs; antennae normal; proboscis normal; palpi of moderate size, numerous bristled; one large downwardly directed bristle on posterior margin of cheek, besides the numerous smaller cheek bristles. Mesonotum with one pair of dorso-centrals; scutellum with four equal sized bristles. Second and fifth segments of abdomen elongated; hypopygium large, knob-like, anal protuberance slightly projecting, with several short bristles. Legs strong; fore tibia with one strong bristle at about middle, mid tibia with two at before basal third, one antero-dorsal and one almost dorsal, and one anterior bristle at near apex; hind tibia with one dorsal bristle at about one-third from base, one antero-dorsal at about same distance from base, and an antero-dorsal one at near to apex. Wings clear, veins yellowish; third vein bristled to fork; fork of third vein acute; first costal division equal to 2-3 together; fourth vein leaving at beyond fork of third with a decided curve.

Length, 4 mm.

Locality: Plummer's Island, Maryland, April 23, 1913 (A. K. Fisher), one specimen.

Near to *curvinervis* Becker, but differing in the bristling of the hind tibia and some minor particulars.

Female similar to male, except in form of abdomen. The sixth segment in this sex is distinctly the longest and the apex of abdomen is rather pointed. Same data as male.

This species is dedicated to W. L. Macatee of the Bureau of Biological Survey, in whose collection the types are.

August, 1913

Botanobia (= *Oscinis*) *varihalterata*, new species.

Female: Glossy black. Frons with triangle glossy, frontal stripe with a silky lustre, anterior margin obscurely brownish; antennae reddish, third joint brown on upper surface; arista brown; face brown; cheeks glossy black-brown; proboscis brown, apical portion pale yellowish; palpi reddish. Thorax without any indication of dusting either on disk or pleurae. Abdomen glossy black on dorsum, especially on apical half, venter opaque brown. Legs yellow, almost white, mid and hind femora except narrowly at bases, and basal third of hind tibiae glossy black. Halteres pale yellow, with an elongate, glossy black streak on outer side of knob. Wings clear, veins brownish yellow. Hairs pale, bristles yellowish brown.

Frons slightly over one-third the width of head; triangle occupying two-thirds the width of vertex, and extending slightly over two-thirds to anterior margin of frons; surface hairs sparse and distinct; antennae of moderate size, third joint rounded; arista pubescent, tapering, in length at least equal to width of frons; cheeks almost linear, especially at anterior margin; marginal hairs distinct, the upper strongest; proboscis and palpi normal; eyes distinctly higher than long, bare. Mesonotum without sulci, the hairs very closely placed and, though in rows, not easily distinguishable as such, the base of each hair in a very minute puncture; scutellum short, rounded in outline, the two apical bristles of good length, the two subapical bristles much shorter, disk haired as mesonotum. Legs normal; surfaces pale haired. Wings with third costal division three-fifths as long as second; veins 3-4 slightly divergent; penultimate sections of veins 3-4 subequal; outer cross vein at one and one-half times its own length from inner and two and one-half times its own length from end of fifth.

Length, 1.75 mm.

Type locality: District of Columbia, June 5, 1913 (J. D. Hood, and J. R. Malloch).

Readily distinguished from any other previously described species by the peculiar mark on the haltere. In this respect the species resembles one in *Agromyza* which occurs in North America.

Apocephalus antennata, new species.

Female: Yellow, subshining. A small black spot on pleura

below wing base and another on the posterior surface of mid coxa. Posterior margin of abdominal segments narrowly browned; ovipositor glossy brown black.

Frons with two rows of four bristles and in front of those a single pair situated close together on middle of frons; lower pair of bristles, represented in *A. wheeleri* Brues, absent; third antennal joint very large, reaching as high as vertex, conical; arista brown, terminal, pubescent, slightly shorter than third antennal joint; palpi large, the surface bristles very minute. Mesopleura bare; mesonotum with one pair of dorso-centrals; scutellum with two marginal bristles. Second abdominal segment elongated, 2-3 bristles on lateral margins; sixth segment elongated and with a few short posterior hairs; ovipositor elongate-conical, four times as long as its basal width. Legs normal; hind tibia with 10-11 postero-dorsal setulae. Wings with costa to middle; first division as long as 2+3; third about one-third as long as second; angle at fork of third vein obtuse; costal fringe twice as long as diameter of costal vein; fourth vein gently arcuated, leaving at fork of third, and ending distinctly in front of wing tip.

Length, 1.5 mm.

Locality: Plummer's Island, Maryland, June 8, 1913 (W. L. Macatee.)

CARNEGIE SCHOLARSHIP IN ENTOMOLOGY.

Mr. John D. Tothill, B. S. A., a graduate of the Ontario Agricultural College, Guelph, has been awarded the Carnegie Scholarship in Entomology in order to enable him to take a year's post graduate course at Cornell University. The value of the scholarship is \$625.00 and includes travelling expenses. These scholarships are somewhat similar in character to the Rhodes scholarships at Oxford and are intended to enable qualified young men in various parts of the British Empire to spend a year in study at some University in the United States. Mr. Tothill is a field agent of the Division of Entomology at Ottawa, and is at present carrying on investigations under the direction of Dr. Hewitt, in the work of parasites of the Brown-Tailed Moth in N. B., his headquarters being at Fredericton.

A SECOND NEW GENUS OF CHALCIDOID HYMENOPTERA OF THE FAMILY MYMARIDÆ FROM AUSTRALIA.

BY A. A. GIRAULT, NELSON (CAIRNS) QUEENSLAND.

The following genus has the general appearance of certain Entedoninae and resembles also species of *Gonatocerus*, but it is very small. It is allied with *Gonatocerus*. Its many-jointed antennae are unique for the family.

Agonatocerus, new genus.

Normal position.

Female: Like *Gonatocerus* Nees, but the antennae 13-jointed, the body much smaller. Proximal four funicle joints small, subequal, the distal six subequal, each over four times longer than any of the proximal four, subequal in length to the pedicel. Fore wings with short marginal fringes. Club solid, not long. Abdomen subsessile, the phragma absent. Scutum with a median grooved line.

Male: Not known.

Type: *A. humboldti*, described herewith.

1. *Agonatocerus humboldti*, new species.

Female: Length, 0.65 mm.

Dusky brown, the base of the abdomen golden yellow, the wings hyaline. Antennae and legs somewhat darker, dusky, the proximal half of the scape pallid. Fore wings without discal cilia under the venation or for some distance beyond, distad bearing about eighteen lines. Mid-longitudinal line of posterior wing without discal cilia.

(From one specimen, two-third-inch objective, one-inch optic, Bausch and Lomb.)

Male: Not known.

Described from a single female captured in the first week of December, 1912, by Mr. Alan P. Dodd by sweeping in a forest.

Habitat: Australia—Nelson(Cairns), Queensland.

Type: In the Queensland Museum, Brisbane, the above specimen in xylol-balsam.

Respectfully dedicated to Alexander von Humboldt.

Mailed August 5th, 1913