



NEW SPECIES OF COLORADO APHIDIDAE.

The Canadian Entomologist.

VOL. XXXIX. LONDON, DECEMBER, 1907.

No. 12.

NEW SPECIES OF COLORADO APHIDIDÆ, WITH NOTES UPON THEIR LIFE-HABITS.

BY C. P. GILLETTE, FORT COLLINS, COLORADO.

In our study of Colorado Aphididæ during the past two or three years, we have endeavoured to trace each species throughout the entire year. In doing this work it has been necessary to make careful descriptions of the lice in all their stages of development. On account of inadequate descriptions of some of the described species, it is impossible in some cases to decide whether a louse under examination is a described species or not, and in other cases there seems to be very little doubt but that the species being studied is new to science. Some of the apparently new species I am describing below. If in any case an old species should be redescribed, I hope I shall give the description and the life-habits full enough in each case so that other workers may be able to tell upon what species I was working. Even this in some cases may not be an easy matter.

Unless otherwise stated, the descriptions are made in each case from fresh living specimens, and the colours given as they appear under a hand lens.

Aphis torticauda, n. sp.

A large red louse on native thistles, *Carduus* sp. Light to dark red in general colour, with antennæ and cornicles black.

Apterous Viviparous Female (Plate 11, figs. 1 and 4).

Described from specimens taken at Fort Collins, Colo., July 22, 1907.

Length, 3.5 to 3.75 mm; width, 2 to 2.20 mm.; antenna, 3 mm. Joints: III .9, IV .6, V .5, VI .14, VII .6 mm. Joint 3 with about 30 and joint 4 with 12 or more small circular sensoria. Joints 1 to 6 with a few short stout hairs on each. The antennæ are upon slight tubercles, and there is a small blunt tubercle on either lateral margin of the prothorax and each abdominal segment. The entire dorsum, including head, unicolorous-red; eyes, distal ends of femora, tibiæ, and all of tarsi, cornicles and antennæ black or blackish. Cornicles about .75 mm. long,

cylindrical, enlarging little or none toward base, and with distinct flange at apex. The cauda is very peculiar in form, is directed up and back, and is moderately broad at the base, but soon becomes small, tapering and crooked, appearing as if it had been twisted off. (Fig. 4.) Beneath the cauda the anal plate is protruded into a blunt point projecting back and ventrally, and appearing, often, more like the ordinary blunt conical cauda than does the real cauda. I have not seen a similar cauda in any other species. Beak long, much surpassing hind coxæ, the third joint long and slender.

Winged Viviparous Female.

Specimens taken by L. C. Bragg at Longmont on June 14, '07,

Differs little from the apterous form; the cauda is somewhat straighter and more symmetrical, wings rather stout, 4 mm. long, with subcostal nervure and stigma rusty-brown. Length of body about 3.4 mm.; antenna much shorter, about 2.10 mm. Joints: III .61, IV .43, V .31, VI .14, VII .49 mm.; cornicles, .50 mm.

Winged Male.

Same date and place as the preceding females.

Colours as in the winged females. Length of body, 2.70 mm.; antenna, 2.40 mm.; cornicles, .54 mm. Antenna joints: III .65, IV .42, V .40, VI .13, VII .50 mm. Joints 3 and 4 strongly tuberculate, the former with about 40, and the latter with a single row of about ten small circular sensoria. Cornicles cylindrical, black. Cauda as in the alate female. Slight antennal tubercles.

Apterous Oviparous Female.

From specimens taken at Fort Collins, Oct. 27, '07.

Colour as in viviparous apterous form, except that the anal plates are conspicuously black.

Length, 2.5 mm. long by 1.35 mm. broad. Antenna, 1.8 mm. Joints: III .50, IV .36, V .30, VI .13, VII .43 mm. On joint 3 are a small number, about 15 to 25, circular, slightly tuberculate sensoria. The cauda is small, pointed, black, upturned, and does not show the peculiar twisted appearance as well as in the viviparous females. Beak reaches considerably beyond hind coxæ. Cornicles, .40 mm. Several specimens taken in copula. They are much smaller than the viviparous females. Oviparous females and males quite numerous, but I find no eggs yet. There are many ant attendants.

In nearly every colony I find a few very dark green oviparous females with reddish head and prothorax. I take them to be a colour variation only.

Apterous Male (Plate 11, fig. 7).

From specimens taken Oct. 26, '07.

General colour sordid yellowish-brown or greenish-rufous, with a pronounced tinge of rufous upon head and thorax, but without the bright red of the females. Antennæ, eyes, distal halves of femora and tibiæ, tarsi, cornicles, beak and anal plates black or blackish. Length of body, 1.75 mm.; length of antenna, 1.60 mm. Joints of antenna about as follows: III .36, IV .30, V .26, VI .11, VII .40 mm. Cornicles cylindrical, .17 mm. in length. Cauda very short, blunt and black. Third joint of antenna with about 20 small circular sensoria; joint 4 with about six, and joint 5 with about four. Joints with a few short stout setæ on each. Beak long, easily attaining hind coxæ.

This is the only plant louse that I have found having two sets of males. Those appearing in July did not continue long, and, being winged, had the semblance of very small females. No eggs were seen until after the appearance of the wingless fall brood of males during the latter part of September and October. This louse is always well attended by ants, and I have been unable to find eggs upon the food-plants in the field, but when the lice are brought into the laboratory and kept for a few days upon thistle, eggs are laid in considerable numbers. They are light green in colour at first, but become polished black in a few days. I cannot help wondering if the ants carry away the eggs.

On May 18 I found what seemed to be stem mothers of this species upon *Carduus* sp. at Akron, Colorado, and about each parent insect were a few light red young of different ages, and the thistles have been continually infested with the lice to the present writing, Oct. 20. We have not found this species infesting any other plant.

Aphis carbicolor, n. sp.

A black louse from stems and leaves of yellow dock, *Rumex*, sp.

Late Viviparous Female, from Fort Collins, June 26, '07.

Black throughout, except for the greater part of the tibiæ and anterior femora, the proximal ends of the middle and posterior femora, and the long basal segment of the beak. The dorsal portion of the body is polished.

Body 1.9, wing 3, antennæ 1.3, cornicles .18 mm. Joints of antenna: III .34, IV .21, V .20, VI .11, VII .28 mm. Cornicles cylindrical, without marked thickening towards base, and without flange at distal end. Antennæ black, wing-veins black, with 2nd fork of cubital vein rather short, stigma rather short and, along with subcostal vein, a little greenish in colour. Hind tibiæ 1.1 mm. long. Prothoracic tubercles rather stout and prominent, and usually the abdominal segments show well-developed lateral tubercles. Cauda short, black and upturned; 3rd joint of antenna with about eight moderately tuberculate sensoria.

Apterous Viviparous Female (Plate 11, Fig. 3), taken along with the alate form.

Deep, dull, sooty-black throughout, never polished; tibiæ, except distal ends, most of anterior femora, bases of middle and hind femora, third joint of antennæ and basal joint of beak, pale yellow or slightly dusky in colour. Body short and broad, almost globular, about 2.5 mm. long by 1.6 mm. broad. Length of antenna 1.3 mm., and the joints measure about as follows: III .40, IV .24, V .22, VI .11, and VII .24 mm. respectively. Cornicles .26 mm. long, without flange at tip, and somewhat broadened towards the base; cauda short and upturned. Tubercles of prothorax and abdomen as in the winged form. There is considerable variation in measurements of antennal joints, but joint 3 is longest, and joints 4 and 5 are about equal.

Apterous Viviparous Female. Taken Sept. 23, '07, at Ft. Collins, Colo.

Varies little from early summer form, but is a trifle smaller. Measurements vary little from: length, 2.10 mm.; width, 1.10 mm.; antenna 1.10 mm.; joints of antenna: III .26, IV .20, V .19, VI .11, VII .23 mm. Cornicles, .21 mm.

Apterous Male (Plate 11, fig. 5), taken at Ft. Collins, Colo., Oct. 6, 1907.

In colour like the females or a little lighter, the abdomen being a dark olive green when put into alcohol. Length of body, 1.30 mm.; antenna, .94 mm.; joints: III .22, IV .16, V .14, VI .10, VII .20 mm. Joint 3 with 8 to 10 oval sensoria of varying size, and joint 4 with about half as many. Joints distinctly crenulate, especially those beyond the 3rd. Cornicles, .11 mm.

Apterous Oviparous Female, taken along with the males above.

Very similar to viviparous form, but a little smaller, about 1.9 mm. long; antenna barely 1 mm. Depositing yellowish-brown eggs about bases of dock stems. The eggs soon become polished black.

A very common species, and nearly all adults are getting wings now. The pupæ have very dark brown abdomens, and the thorax is dark green. The shorter cornicles dull black colour, and shorter 6th and longer 7th joints of the antenna are characters separating this species from *Aphis medicaginis*, with its shining black apterous females, and which infests a large variety of plants.

This was a very abundant louse upon the stems and leaves of *Rumex* during the month of June and the early part of July, 1907. By the last of July the enemies of this louse had so reduced its numbers that Mr. L. C. Bragg, who was making constant field observations for me, was able with difficulty to find specimens through the month of August, and then they were found close to the ground. By the first of October they had become quite abundant, but to the casual observer would be unnoticed, as they remained close to, or even somewhat beneath the surface of the ground. At this writing, Oct. 20, the males and oviparous females are very abundant, as are their eggs, upon the bases of the leaves and dead seed stalks. Winged females were abundant during June and July, but have been entirely absent since about the last of September.

So far as Mr. Bragg or I have been able to observe, this louse confines its attacks to the genus *Rumex*.

Drepanosiphum Braggii, n. sp.

I take pleasure in dedicating this interesting new species to Mr. L. C. Bragg, who is a most careful and enthusiastic student of nature, and who first discovered this species upon box elder at Fort Collins, in the summer of 1906.

Alate Viviparous Female.

Described from specimens taken at Fort Collins, Oct. 18, '07

General colour of head, prothorax and abdomen pale greenish-yellow; of mesothorax pale yellowish-brown; eyes bright red, cornicles concolorous with the abdomen at base, rusty-brown in distal half, and may be black at extreme tips; antenna pale yellowish-brown, with distal ends of joints 3, 4, 5 and all of joint 6 black; tibiae entirely dusky, tarsi blackish, femora all concolorous with abdomen. Antenna very long, filiform, a little more than twice the length of the body, 7th joint, if whole, the longest.

Length of body 3, wing 4.6, antenna 6.3 mm. Joints of antenna about as follows: III 1.5, IV 1.4, V 1.2, VI .22, VII 1.8 mm. Third joint with a single row of about 7 to 10 sensoria on the under side of the

basal half. The sensoria are rather small, transverse and not much tuberculate, and the sixth joint tapers gradually into the seventh. Frontal tubercles for antennæ large, vertex hardly convex, prothorax rather long and rectangular in form, and without lateral tubercles; cornicles .66 mm. long, cylindrical and somewhat constricted near distal end. Terminal joints of abdomen prolonged into a sort of short ovipositor (for depositing young). Cauda short, conical, upturned; beak barely attaining 3rd coxæ: length of hind tibiæ 2.6 mm.

These winged females are fairly common yet among oviparous females and young upon the under side of leaves of box elder on college campus. A very active louse with long legs, and it often jumps from the leaves when disturbed.

There seems to be no apterous viviparous form in this species.

Apterous Oviparous Female (Plate 11, fig. 6).

Described from specimens taken at Fort Collins, Oct. 18, '07, from the box elder.

In general colour varying from very light greenish-yellow to a sordid or even dusky yellow, becoming darker with age. Antenna very pale yellow, annulated with black as in winged form; colour of legs and cornicles and eyes as in winged form. The body of this egg-laying female is very peculiar in having an extremely elongated ovipositor-like end to the abdomen. The distance from the cornicles to the tip of the abdomen is nearly one and one-half mm., or more than one-third the entire length of the body. Length of body, 3.8 mm.; length of antenna 5.55 mm.; joints: III 1.2, IV 1.14, V 1.11, VI .20, VII 1.71 mm. Length of hind tibiæ 2.22 mm. Cornicles cylindrical, gently curved, enlarged slightly towards the base, and 6.5 mm. in length. Prothorax without tubercles; body set with scattering hairs; joints of antenna with a few minute hairs upon each segment. The cauda is small, broad and upturned, and quite inconspicuous. These females have fully-developed ova at this time, and are present in considerable numbers on the under side of the leaves of box-elder trees upon the college campus. I find them most common upon small twigs near the trunk and upon small shoots thrown out about the trunks.

Winged Male (Plate 11, fig. 8).

Specimens taken along with above described females.

General colour very light green or greenish-yellow, with or without a tinge of brown on head and thorax, and a deeper brown on more or less of cornicles. Upon the dorsum of the abdomen are two to four black

blotches in the region of the cornicles, and the antennæ are black to near the base of joint 3. Other dark parts as in alate female.

Length of body, 2 mm.; antenna, 5.2 mm. Joints of antenna as follows, with small variations: III 1, IV 1, V 1, VI .17, VII 1.75 mm. Fully two and one-half times the length of the body. I think this is the longest antenna for length of body I have ever seen among the Aphididæ. Vertex barely convex between the frontal tubercles. Joint 3 with a very large number (probably as many as 100) small transverse sensoria occurring upon all sides, joint 4 with about half as many, and joint 5 with 20 or more, all upon one side. The young lice have capitate hairs.

Except for the long cornicles, this species seems a close relative of *Drepanosiphum acerifolii*, and it has the same general habits. The males are specially given to jumping when disturbed, and the strange-appearing oviparous females use their long drawn-out abdomen, which is suggestive of an elephant's proboscis, with which to feel around in the crevices of the bark of the trunk and large limbs for suitable places in which to deposit their pale yellow eggs, which are placed singly or in small clusters. The stem mothers in the spring also acquire wings as in case of *acerifolii*.

Egg laying begins about the first of October.

The box elder seems to be the only food-plant for this species, and it continues upon this food-plant throughout the season.

Callipterus robinia, n. sp.

From leaves of black locust, *Robinia pseudacacia*.

Winged Viviparous Female.

Described from specimens taken in Denver, Colorado, Sept. 3, 1907.

A pale lemon-yellow or greenish-yellow louse, with red eyes. Distal ends of joints 3 to 7 of the antenna, tarsi, extreme apex of short beak and a spot near distal end of hind femora black, and a dusky spot in stigma of wing. No other dark markings.

Length of body 1.6 to 1.8 mm. Length of antenna 1.6 mm., or barely attaining tip of abdomen, and without hairs. Joints: III .60, IV .38, V .34, VI .14, VII .07 mm. Sensoria rather large, transversely oval, closely placed, and about ten in number on basal one-half of joint 3. One large sensorium near the end of joints 5 and 6. Abdomen smooth except for a lateral row of small tubercles on either side. Subcostal vein of fore wing moderately bent forward at base of stigma, second transverse nerve moderately sinuate, nervures dusky-brown, costal nerve of hind wing sharply bent downward to meet second transverse nerve, the transverse nerves nearly straight; cornicles tuberculate, swollen at base, prominent; cauda knobbed. Head and prothorax broad, the latter without tubercles, middle ocellus prominent,

A white line beginning at base of each antenna extends over the dorsum of the head and thorax, and is continued over all segments of the abdomen as a powdery white spot upon each segment. There is also a broken line along either lateral margin, beginning back of each compound eye, and appearing as white spots on the abdominal segments to and including the 5th.

Oviparous Female.

Specimens taken at Denver, Colo., Oct. 12, '07.

General colour pale green, the dorsal surface of thorax and abdomen covered with numerous dusky spots and transverse dashes, each of the dusky spots giving rise to a capitate hair.

Length of body, 1.9 mm.; length of antenna, .95 mm. Antenna joints: III .36, IV .20, V .14, VI .11, VII .06 mm. Antenna dusky-brown to blackish in colour, with joints 1, 2 and 3 lighter. Legs dusky-brown; cornicles short, tuberculate, not longer than broad; cauda very small and upturned. Segments 6, 7 and 8 of abdomen much prolonged. No sensoria on any of the segments. Eyes red, or gray with red centres.

Winged Male.

Taken from black locust at Denver, Colo., Oct 12, '07.

General colour light green, with head, middle of pronotum, lobes of mesothorax, scutellum, transverse dash on the hind margin of metathorax, abdominal segments 1 to 6 inclusive, and transverse bands on segments 7 and 8 black. In some examples these black dashes do not show on all of the segments. The tip of the abdomen, the antennæ, distal portions of the femora, tarsi, pleura of mesothorax, and the mesosternum are also black or dusky in colour. Eyes light red at centre, but gray about the margins.

Length of body, 1.50 mm.; length of antenna 1.11 mm. to 1.6 mm.; length of wing 2 to 2.40 mm. The veins of the wing slightly dusky. Cornicles very short, tuberculate, not longer than broad. Joints of antenna: III .60, IV .34, V .30, VI .16, VII .09 mm., with considerable variation in different specimens. Joint 3 has a single row of about 15 to 20 transverse sensoria upon the under side. Joint 4 about six, and joint 5 about five, and joint 6 with three similar sensoria. Abdominal segments 1 to 5 are tuberculate upon lateral margins.

The white lines and spots described for the viviparous female are also traceable to a greater or less extent upon the male, and are usually quite distinct upon head and thorax. The black dashes on segments 3 to 6 of the abdomen may be indistinct, missing, or in spots only.

FURTHER NOTES ON THE OCCURRENCE OF *HEPIALUS*
THULE, STRECKER, AT MONTREAL.*

[BY H. H. LYMAN, M.A., MONTREAL.]

In 1893 I read a paper on the occurrence of *Hepialus Thule*, Strecker, at Montreal, before the Entomological Club of the American Association for the Advancement of Science at Madison, Wis., which was afterwards published in the December number of the *CANADIAN ENTOMOLOGIST* of that year. That paper embraced everything that was known of this species up to that date, but since then various facts of interest in connection with it have come to light.

From the above date, I hunted for it in its then only known locality every year when at home in its season, but absolutely without success up to July, 1901, when, on the 11th of that month, after a hard bicycle ride out on the upper Lachine road, I arrived at the spot on the brow of the old sea terrace where others had seen it, in time to see one swinging back and forth in its peculiar oscillating flight. Hurriedly mounting my net I made a stroke at it, but the tall growth of grass and weeds masked the edge of the bank, and I missed my footing and came down sprawling, the coveted prize, as usual, dropping into the grass. I was up again at once, and when the moth again rose in flight, but this time straight away to escape, I made a more accurate stroke and secured it, but that ended the sport, and no other was seen either on that evening or subsequently.

In 1902 it occurred to me that there was no reason why the species should not be found at Montreal Junction, situated on the brow of the same old sea terrace, a few miles further to the south-west, at a point where it began to trend to the north-west, and as it was much easier to go out the ten minutes' run by railway than to ride out to the other point on a bicycle, I suggested to Mr. Winn our making a trip out there on the evening of July 16th. We reached that point a few minutes before 8 o'clock, and agreed to separate, as we could thereby cover more ground. Mr. Winn went to the south-east, while I went more to the north-west to a pasture on the brow of the terrace just beyond the house of a cousin. There was a steep gully, probably caused by a landslide many years ago, running down to the lower level covered by bushes and scrub of various kinds, and in this gully several large trees had grown up. I had only just got to the place when I saw a number, apparently half-a-dozen or more, swinging back and forth in the air, as though participating in a dance,

*Read before the Annual Meeting of the Entomological Society of Ontario,
Nov. 1st, 1907.

December, 1907

above the further edge of the gully and quite out of reach of my net. Gradually one swung lower and lower, till by making an upward spring I was able to secure it. It was a male in perfect condition. After that the others mounted over the tops of the trees in the gully, where it would have needed a fifty-foot pole to reach them, and I could only stand and watch them till, as the dusk deepened, they gradually disappeared, but where I could not see. I could only see that gradually there were fewer in the group, till at last all had vanished. Mr. Winn saw none where he went. I went out again a night or two afterwards with a long bamboo fishing-pole, to the end of which I could attach a net, but, though the evening appeared favourable, not a single moth appeared. My cousin having kindly offered to look for these moths for me, I left the net and killing-bottle with him, and he went out every fine evening as long as there was any chance of finding them, but none were seen. The next year, 1903, I again went out on the 13th of July, and my cousin again hunted for me, but none were seen.

In this year Mr. Charles Stevenson's family spent some time at Montreal South, between Longueuil and St. Lambert, and Mrs. Stevenson discovered a locality for *Thule* not far from the house where she was staying, and ten specimens were taken. Learning the whereabouts of the locality, I went over on the evening of July 18th, in company with Mr. Winn, but none were flying. In 1904, I believe, I again tried to find them, but again without success, but this year my cousin's perseverance was rewarded by securing one specimen. In 1905 they were very plentiful at Montreal South, and many were taken on different evenings by the members of the Montreal Branch, the evenings on which I took them being the 8th, 12th and the 15th, on which latter date they were becoming ragged. The locality is a tract of land used as a pasture, but a large part of it is covered by a young growth of various trees and bushes, among which willow scrub is prominent. From the fact that many of the moths were taken among or near the willows, it seemed probable that the larvæ bored in the roots of that tree, but the credit for the actual discovery belongs jointly to Mr. Charles Stevenson and Mr. A. E. Norris, who went over by an early boat on a Saturday afternoon and searched carefully among the willows, and were each rewarded by finding a cast pupa-skin on the ground among the willow roots.

The same year Mr. Arthur Gibson discovered the species at Ottawa, as he has interestingly told in the *Ottawa Naturalist* (Vol. XIX, 117),

attention being drawn to the fact that the moths in life are of a much brighter yellow than in the cabinet, the colour changing soon after death. Mr. Denny has informed me that in 1905 Mrs. Denny discovered another locality for it at Amherst Park, on the northern outskirts of Montreal, and that a number were taken by his family and by Mr. Stevenson, and the latter has informed me that he also found it in a different locality.

In 1906 I was absent in England, but am informed by Mr. Winn that he visited the locality at Montreal South three times, and took twelve specimens in all, and Mr. Denny also took it at Amherst Park. This year I again visited the locality at Montreal South, but with very poor results. The first time was the evening of the 13th of July, but, though conditions seemed favourable, none were flying. I supposed that owing to the lateness of the season I was too early. I intended going over a week later, viz., Saturday, the 20th, but the weather was rainy. On the 24th I went again, and while hurrying along the railway track on my way to the locality I sighted a single specimen indulging in the usual gambol back and forth, but this time not more than five feet above the ground.* I hastened to mount my net, but while doing so had to back away from the moth, which in its oscillating flight was gradually approaching me, as though attracted by the white waistcoat which I was wearing; as soon as possible I made a stroke with my net and thought I had secured it, but on careful examination found my net was empty and the moth had disappeared. While waiting to see if it would again appear it rose from the grass into which it had dropped, and, as usual, started off in a straight line of flight, but a second stroke netted it, and it proved to be a male in perfect condition, while in 1905 many specimens were ragged by the 15th. I hastened on to the old locality, expecting to find them flying there in numbers, but no more were seen. I went again on the 26th, though the evening was unfavourable, as it seemed to be the last likely opportunity, but none were seen.

In contradistinction to my lack of success at Montreal South, Mr. E. Denny and his son Arthur had great success in collecting the species at the Amherst Park locality, taking about seventy-five specimens, and also made the independent discovery of cast pupa-cases among the young willows. Mr. D. S. Kellicott was led from his observations to believe that *Hepialus Argenteomaculatus* which he found boring in *Alnus Incana* required three years to complete its transformations, (Ent. Amer. I, 173, IV, 153, Insect Life I, 250). If these observations were correct, it would seem to be probable that *Thule* may also take three years to complete its

cycle, in which case another large flight of the species might not be due at the locality in Montreal South until 1908. As mentioned in a paper on specimens in the British Museum (CAN. ENT., XXXVII, 31), I found a specimen of *Thule* which had been in that collection since 1844, and which had been taken in the Hudson's Bay territory by George Barnston, proving that the species has a much wider distribution than had formerly been supposed.

Mr. Denny was led to seek the species this year by finding a specimen attracted to light, and there are a number of similar instances. The original type specimen must have been so attracted, as it was found, as mentioned in my former paper, in Phillips Square, the centre of the up-town retail business district, and several miles from its nearest possible breeding locality. The specimen secured by Mr. Bowles had also, evidently, been attracted to light, and Mr. Brainerd obtained one similarly attracted to Sherbrooke Street, in the fashionable residential district, and Mr. Gibson's specimen had also come to light, and I believe that attraction to light is the only thing which will cause them to fly after their usual time. Very few specimens, however, seem to be so attracted, as the above instances are all of which I have learned, and the places to look for the moth are where there is a good growth of willow scrub, and between 8 and 8.30 p.m. during the second and third weeks of July.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The forty-fourth annual meeting of the Society was held in the Biological Building of the Ontario Agricultural College, Guelph, on Thursday, October 31st, and Friday, November 1st. The chair was taken by the President, Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms. Among those present were Rev. Dr. Fyles, Levis, P. Q.; Mr. Henry H. Lyman, Montreal; Mr. Arthur Gibson, Central Experimental Farm, and Mr. C. H. Young, Ottawa; Dr. Brodie, Dr. E. M. Walker, Mr. J. B. Williams and Mr. C. W. Nash, Toronto; Mr. J. F. Calvert, Orangeville; Professors Hutt, McCreedy and Bethune, Messrs. Jarvis, Eastham, Howitt, Zavitz, Crow, Klinck, and a number of students of the Ontario Agricultural College; Mr. Howse, Principal of the Consolidated School, Mr. Graesser and others, Guelph.

The proceedings began on Thursday afternoon with a conference on Fruit-tree Insects. Mr. L. Caesar gave an account of the Bark-beetle (*Scolytus rugulosus*) attacking cherry-trees in the Niagara district; the

subject was discussed by Dr. Fletcher and Mr. Jarvis. The work of the Codling-worm and its ravages this year, the Oyster-shell scale, the Woolly Aphis, Flea-beetles and other insects were taken up and discussed by Dr. Fletcher, Dr. Brodie, Professors Hutt and Bethune, Messrs. Jarvis, Nash, Caesar, Crow, Frier and Thompson. The remainder of the afternoon was occupied with the reading of the reports of the Directors on the insects of the year in their respective districts.

In the evening MR. A. H. KIRKLAND, of Boston, who is in charge of the efforts now being made in Massachusetts to suppress the Gypsy and Brown-tail Moths, gave a highly-interesting account of the work and the results that have so far been accomplished. His address was illustrated with a series of lantern pictures, which graphically showed how the operations are carried on. He described also the importation of parasites and some predaceous beetles from Europe, and the amount of success which had so far attended their efforts to breed them. DR. FYLES followed with one of his charming papers, "The Voices of the Night." Much regret was expressed that the attendance was small owing to the attractions of the holiday.

During the second day, Friday, November 1st, meetings were held both morning and afternoon in the Entomological Lecture-room, and were well attended by the members and students. The reports of the Council, Officers and Branches of the Society were presented and read, and the following papers: "The Two-winged Flies of the Province of Quebec," by Dr. Fyles; "Further Notes on *Hepialus thule* at Montreal," by Mr. Lyman, and notes on the same insect by Mr. E. Denny, of Montreal; "Scale Insects of Ontario," illustrated by a large number of specimens, by Mr. Jarvis; "An Unusual Outbreak of *Halisidota* Caterpillars," by Mr. Gibson; "A Remarkable Outbreak of the Variegated Cutworm," by Prof. Bethune and Mr. Caesar; "The Entomological Record for 1907," by Dr. Fletcher. Papers by Dr. Fletcher and Prof. Bethune on the Insects of the Season, 1907, were not presented, owing to want of time. Dr. Fletcher closed the afternoon's proceedings with his Presidential address on "The Entomological Outlook in Canada."

In the evening a public meeting was held in Massey Hall, when an interesting address was given by DR. E. M. WALKER, of Toronto, on Collecting and Rearing Dragon-flies at the Georgian Bay Biological Station. A large number of beautiful lantern views were given in illustration of the lecture.

The election of officers for the ensuing year resulted as follows :

President—James Fletcher, L.L.D., F. R. C. S., F. L. S., Entomologist and Botanist of the Experimental Farms, Ottawa.

Vice-President—Tennyson D. Jarvis, B. S. A., Lecturer in Entomology and Zoology, Ontario Agricultural College, Guelph.

Secretary—L. Caesar, B. A., O. A. College, Guelph.

Treasurer—S. B. McCready, B. A., Professor of Botany and Nature Study, O. A. College and Macdonald Institute, Guelph.

Librarian—Rev. C. J. S. Bethune, M. A., D. C. L., F. R. S. C., Professor of Entomology and Zoology, O. A. College, Guelph.

Curator—J. Eaton Howitt, B. S. A., Lecturer in Botany, O. A. College, Guelph.

Directors : Division No. 1—C. H. Young, Ottawa.

Division No. 2—C. E. Grant, Orillia.

Division No. 3—J. B. Williams, Toronto.

Division No. 4—C. W. Nash, Toronto.

Division No. 5—George E. Fisher, Burlington.

Division No. 6—J. A. Balkwill, London.

Auditors—B. Barlow, B. S., and J. Crow, B. S. A., Ontario Agricultural College, Guelph.

Editor of the "Canadian Entomologist"—Rev. Prof. Bethune, Guelph.

Editing Committee—Dr. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; Prof. Lochhead, Ste. Anne de Bellevue, P. Q.; G. E. Fisher, Burlington; J. B. Williams and C. W. Nash, Toronto.

Delegate to the Royal Society—Arthur Gibson, Ottawa.

NOTES ON THE COLLECTING OF STHENOPIS (HEPIALUS) THULE.*

BY E. DENNY, MONTREAL.

Very little appears to have been written by entomologists on the above subject, and no doubt the cause is due to the conditions that surround the life habits of these mysterious moths. In the first place, there is a good deal of uncertainty as to the time of their flight or appearance. Secondly, the distance to be travelled to reach their haunts often means the loss of much valuable time to the collector; and thirdly, the exceedingly short

*Read at the Annual Meeting of the Entomological Society of Ontario, Guelph, Nov. 1, 1907.

December, 1907

period of flight. These are the chief obstacles that present themselves to the collector whose ambition is to try and improve his knowledge by putting forth whatever energy he possesses. For the past two or three years I have been very anxious to find out something concerning the habits of this particularly interesting moth, which occurs for a period of a few days only, and with few exceptions for only a few minutes at a time at twilight. These moths are termed "Ghost Moths," and no doubt derived that name from their peculiar habit of flight, for just as it is getting dark they seem to appear of a sudden from no particular place, make a few erratic evolutions in the air, and disappear as suddenly as they appeared.

It was on the evening of the 16th of July, 1906, that my son Arthur had the good fortune to catch *Sthenopis thule* at light on Park Ave., Montreal. He had been collecting at the electric lights, and was about to return home when his attention was attracted by the peculiar flight of a moth, which in a few seconds settled in the road, and proved to be *Sthenopis thule*. We at once turned our attention to this particular moth, abandoning all other species for the time being. Previous to this we had discovered a new locality where *thule* could be found. Although personally I had never visited what is known as the old original hunting grounds known as Montreal West and South, but from information gained I was able to form a good idea of what the conditions were. I at once came to the conclusion that the locality referred to above, known as Amherst Park, was the right spot, being much nearer the city, and disposing of the uncertainty of catching the ferry boats, and it was to this locality that our efforts were directed. From the 16th to the 23rd of July this spot was visited regularly, the result being that 12 specimens in all were taken. This was not thought very encouraging considering the time and expense incurred in collecting them. The following year we visited this spot each night regularly from the 9th, but strange to say no *thule* was seen until July 16th, exactly the same date as our first capture the year before, but on this occasion three specimens were taken. The following night an expedition was arranged and we proceeded to invade the haunts of this mysterious moth. On this occasion the moths were very lively, and appeared to fly longer than usual. However, darkness soon put an end to the sport, and when the material was gone over it was found that 32 specimens had been captured. This I consider a good catch. The greatest number of these were males, and I attribute the

length of flight on this occasion to the absence of females, for it would appear they only fly long enough to find and select a partner, and mating takes place immediately. The next night an early start was made to search the bush before dark, our object being to try and find them before it was time for them to fly. This was successful also, for both imagoes and pupæ shells were secured, the former on the stems of the Willow, and the fresh pupæ shells on top of the ground. On this occasion, as on the following night, the flight was very short, and females were plentiful; 10 specimens were taken on the 18th, and on the 19th 18 specimens of *thule* and a fine specimen of *Sthenopsis quadriguttatus* were added. A careful search of the bushes after dark gave us four pairs in copulation. This was something new to us also, and was taken advantage of the following night with good results, moths being secured before it was time for them to fly. July 19th and 21st were unfavourable for collecting, owing to wet weather. July 20th, however, eight specimens were taken, and on the 22nd four more were added, and this proved to be the last, for although the search was kept up, none were seen after that date. On that evening a number of Sphingidæ were seen at the Willow, and three or four specimens were taken. We were about to give up the pursuit on account of darkness, when we saw something hovering about the top of the bush, gradually working its way to the other side. By a quick turn and swing of the net my son managed to land it, and to our surprise it was a female *thule*. We had never seen one fly like this before. The dates of flight herein mentioned are somewhat late, but I attribute this to the unusually late spring and cool summer, and would be inclined to say that under anything like normal conditions their appearance would be from about July 8th to the 20th. The time of flight each night is on an average about fifteen minutes, and none were seen on the wing before 8 p.m., and not later than 8.30 p.m., with the exception of the specimen we have referred to taken at light.

Our efforts were well rewarded, for in all 75 specimens were taken, and a little information gained as to the habits of *Sthenopsis thule*.

NOTE.—It was the unanimous opinion of those present at the meeting when this paper was read that such wholesale captures of this rare moth were most strongly to be deprecated. Collectors should be satisfied with a few specimens annually, and not run the risk of exterminating a most interesting species, which is only known to frequent a few very limited localities.—ED. C. E.

STUDIES IN THE GENUS *INCISALIA*.

BY JOHN H. COOK, ALBANY, N. Y.

When I began the investigation of these butterflies some years ago, four species referable to the genus *Incisalia* were known to occur in the eastern half of the continent, *irus*, *Henrici*, *augustus* and *niphon*. It was my aim to breed each from egg to imago, and by a careful comparative study to furnish the biological data which would enable anyone taking an active interest in the group to repeat the observations, verify and supplement the facts, and to correct any errors which I may have made. I hoped also by outlining the life-histories of these four species to furnish a basis for the proper study of the western representatives of the genus, a work which is reserved for that lepidopterist of the trans-Mississippi region who will one day arise to tell us something of the early stages of those species known to most of us in the east as dead and dried "specimens" only.

The fact that the species mentioned were the only members of the group which had been recognized in Eastern North America,* lent to the prospective success of the undertaking the added value of a comprehensive study of all the species found over a comparatively wide area.

Recently, however, a fifth species has been unearthed. It was described in the CANADIAN ENTOMOLOGIST for June, 1907 (p. 202), as *Incisalia polios*. The discovery of this butterfly within the territory which I had expected to cover made it necessary to work out its life-history or to forego that degree of completeness which I had planned for my review of the genus.

The memory of many days of failure preceding final success in other cases did not lend encouragement to the hope of securing the desired information and material during the brief stay which would be possible at the end of a two-hundred-mile journey, but as nothing can be accomplished without an effort, I determined to make the attempt.

Accordingly, arrangements were made to visit the type locality (Lakewood, N. J.) early in May, 1907, in company with Mr. Frank E. Watson, to whose work the recognition of this species was largely due, and Mr. Chas. H. Sunderland, of Rutherford, N. J., an ardent collector of lepidoptera.

*Unless the *arsace* of Boisduval and Leconte should prove to be entitled to specific distinction.

As it was possible for me to go to Lakewood before the others, Mr. Watson very kindly provided me with a detailed map of the region, showing the exact points where in previous years he had taken the species. I arrived about noon on the 3rd, and went immediately to the collecting ground. It had rained during the morning, and as clouds obscured the sun during the rest of the day, the vegetation remained wet; but despite the unfavourable weather I took three males and one female of the new species, and confined the last in a gauze bag over *Vaccinium corymbosum*. During the evening it began to rain again, and the downpour continued until 10.30 the next morning. The storm area then passed off to the east and the sun shone brightly, though a high wind marred the prospect of finding many butterflies about. The map enabled me to locate all points readily, and from what I knew of the congeners of *polios*, I felt confident that the insects would again be found frequenting the same sunny spots and flitting back and forth over the same restricted stretches of sandy road. Such proved to be the case, and before one o'clock I had captured a dozen or more. Of these one was a female, and I confined her over *Kalmia angustifolia*.

I had just taken another female when I was hailed by Mr. Watson and Mr. Sunderland, and in the excitement of pleasant greetings the butterfly was left a little too long in the stupefying bottle,* and did not recover. Our combined efforts for the rest of the afternoon resulted in the capture of several males and two females. Of the latter, one was confined over cranberry and the other over sand-myrtle, *Dendrium (Leiophyllum) buxifolium*.

The following day appeared to be ideal for butterfly collecting, but for some unexplained reason very few were on the wing. The female tied up on *corymbosum* had died during the night, and none of the survivors gave indications of a desire to oviposit. A hasty survey of the surrounding flora induced us to alter our plan, and each female was supplied with a variety of plants. Until the lengthening shadows put an

*In endeavouring to secure living females of species where the sex is not readily discoverable, I have found it of advantage to use a very weak cyanide bottle, from which the insect should be taken as soon as it loses the power of flight. If then, upon examination it proves to be of the desired sex, a few minutes in the air will usually suffice to restore it completely.

end to butterfly activities, we patrolled the roads, explored the underbrush or watched the imprisoned females, in an endeavour to gain some hint of the secret we had come to discover. Before evening we had managed to add four living females to our catch, but had observed nothing which narrowed the circle of probable food-plants, and thus the time to leave Lakewood found us no wiser than before.

On a purely theoretical basis it seemed likely that the food-plant would prove to be one of the *Ericaceae* (the dominant family in that region of sand and bog), and, if so, probably some ericaceous species not found at Albany, since the butterfly does not occur here. Accepting this tenuous hypothesis for lack of a better guide, I brought home cranberry, sand-myrtle, laurel (*Kalmia latifolia*) and *Andromeda* sp. Mr. Watson took one female to New York, and kept her shut up with *Pyxidantha barbulata* until she died, but secured no egg. Five of the other six reached Albany alive, and were put in a large "cage" with the plants brought from New Jersey, and a number of possibilities from the local flora.

The record for the next few days is mournful reading; it all belongs to the obituary column. The last of my females died on the 15th without having yielded ova, and I immediately wrote to Mr. Watson to meet me in Lakewood on the Saturday following. Meanwhile I dissected one of the butterflies, and was greatly pleased to discover that the eggs were very different from those of the congeneric species, and could be identified without difficulty.

I reached the Lakewood locality early in the afternoon of the 17th. The day was cold and cloudy, and not a butterfly was seen. I examined as much of the pyxie and sand-myrtle as was possible before nightfall, but my only reward was an aching back.

Saturday dawned clear, warm and delightful, and before 8.30 I was in the field awaiting the butterflies. *Brizo*, *troilus*, *philodice*, *comyntas*, *juvenalis* and *ladon* added to the pleasure of a typical May morning; *augustus* was abundant, and several *niphon* and one *irus* were taken, but *polios* had apparently disappeared for the season. I did capture one, but as it proved to be a male I released it. The prospect was discouraging, and there was nothing to be done but to continue the uncomfortable search for eggs. This I did religiously but without much heart all the afternoon.

Mr. Watson came down on the evening train, and I reported my lack of success. We held a council of war, and decided that, in view of the scarcity of *polios* in the local field, it would be wise to move our base of operations to Lakehurst, a few miles further south, where also the species was known to occur.

We boarded the 9.05 train the next morning, and reached Lakehurst at 9.20. Crossing the dam of the cranberry bog just north of the station, we started for the highway running back to Lakewood. A rod or two along the north edge of the bog we found two *polios* playing beside the path, and I sat down to watch them. Mr. Watson elected to go ahead. I soon concluded from the actions of the butterflies that they were unmated males, so turned my attention from them to the surrounding vegetation. There was no sand-myrtle to be seen, and I noticed only one small patch of pyxie. The butterflies were resting on leaves of bearberry (*Arctostaphylos uva-ursi*), to which they returned after short flights induced by touching them with a grass blade. Although this plant had not been observed at Lakewood nearer than a quarter of a mile from the road where the butterflies were taken, the fact that it was an ericaceous species suggested the advisability of looking it over. Oh, happy inspiration! On the pedicel of the very first flower examined there was an egg, echinoid and undoubtedly Lycænid. With a lens the sculpture could be made out, and I recognized it immediately as the egg of *polios*. Concealing my elation, I proceeded along the path in the direction taken by Mr. Watson, intending to give him a surprise. I was given one instead. He arose from a bed of *Arctostaphylos* with a shout of triumph, and handed me another *polios* egg which he had found at the base of the leaf-bud. This double discovery was made at 9.35, fifteen minutes after leaving the train.

Past disappointments were forgotten. We began a systematic search for the ova, and within an hour had collected ten more and an empty shell.

On the return journey another bearberry patch attracted attention, and we halted long enough to secure five more eggs. A female taken near-by was confined in a can under gauze with some young shoots, and generously added four eggs, bringing the total up to nineteen. Arrived at the Lakewood locality, we put aside our collecting outfits and carefully went over the ground, looking for the food-plant. It was not to be found. We then examined the bearberry nearer the village, in the vicinity of

which no *polios* were found this year (1907), though Mr. Watson had taken one or two the preceding spring. Not an egg was discovered,* and it would seem that—unless we overlooked a plant not at all difficult to find—the species has a second food-plant at present unknown.

Mr. Watson took a few of the ova, and succeeded in bringing one of the larvæ through all its changes. I brought the rest to Albany, and they all hatched between May 23rd and 28th. On the 24th sixteen eggs which had been collected at Lakehurst by Mr. William P. Comstock, were sent to me by Mr. Watson. In spite of the difficulty of obtaining fresh food (the nearest locality for bearberry known to me is some sixteen miles from here), and the consequent mortality among the caterpillars, a few lived to pupate, and the life-history is practically complete.

Not altogether satisfied with a laboratory knowledge of the larvæ, a third trip to New Jersey was made for the purpose of studying them in the field. June 29th found us at Lakewood once more, but a driving rain effectually prevented our doing anything during the morning. This had simmered down to a mere drizzle by lunch time, so, donning raincoats, we started to walk to Lakehurst. Comprehending our plan, the wily storm swung around and came tearing back with greater fury than before. As there was no shelter to be had along the railroad track, we were thoroughly drenched before reaching our destination. Purchasing some dry underclothing, we sought the bearberry locality, and after an hour's search discovered a full-grown caterpillar.

The next day was spent in the same region, and between showers we collected three more larvæ, all of which had passed the final moult. All of the four taken in the field appeared to be healthy, and pupated within a few days. If any were parasitized it will not be evident until next spring.

The above account is given principally to indicate the rather limited opportunities which the author has had for studying this species. The generalizations concerning feeding habits of the larvæ, etc., which will appear in a succeeding paper, are based upon the meagre data obtained during these three visits to New Jersey, and are subject to correction in the light of broader experience. The life-history of *polios* will be given in detail as soon as possible.

*Eggs were subsequently found in this patch by Mr. William P. Comstock, of New York City, the larvæ from which were bred to maturity by him.

NOTES ON HEMIPTERA.

BY G. W. KIRKALDY, HONOLULU, HAWAIIAN ISLANDS.

Fam. Geocoridae.

1. *Stalagmostethus pandurus* (Scop) [= *Lygaeus militaris*, Auct.].—India, Kangra Valley, 4,500 ft., July (Dudgeon).
2. *S. albomaculatus* (Goeze).—Hungary, Budapest (Burr).
3. *Arocatus aenescens*, Stal, 1874 = *Scopiastes Bergrothi*, Kirkaldy, 1903!
4. *Graftostethus servus* (Fabr.).—Queensland, Brisbane; 1 ♀.
5. *Cenocoris Dudgeoni*, Kirkaldy.—Distant declares this to be the same as *C. marginatus* (Thunb.), but I doubt it. What I suppose to be the nymph is blood-red. Eyes, antennae, meso- and metanotum, femora, tibiae and tarsi, the odoriferous flaps, last stemite, etc., blackish. Fore femora unarmed. Pronotum deeply impressed ovals down the middle. Tarsi all a little widened apically, and furnished with a pad.

6. *Pyrrhobaphus*.—Distant (1903, Faun. Ind., II, 14) says that the first segment of the antennae nearly extends to the fore coxae, but his figure 8 does not confirm this. In his "Synopsis of genera" (p. 3) delete "Orifices red or pale coloured" from *b*1.

Fam. Reduviidae.

7. *Ptilocnemidia lemur* (Westw.)—Queensland, Brisbane.

Fam. Miridae.

8. *Monalonion Peruvianum*, sp. nov.—Polished and shining. Head black, a curved line from near the insertion of one antenna to that of the other, via the base of the head, the under side of the head (except the clypeus), etc., reddish-yellow. Antennae black, not pale at their insertions, 4th segment reddish. Rostrum yellow, more or less infuscate. Pronotum yellow, collar and the hind margin (widening medially) blackish. Scutellum and tegmina immaculate blackish, membrane and wings very dark smoky, veins concolorous, not polished. Sterna, coxae and abdomen immaculate orange; rest of legs black, middle femora with a ferruginous ring near the base, hind femora with basal two thirds pale (though the extreme base is blackish). Head nearly three times as wide as long, a trifle more than one-half of the width of the hind margin of the pronotum. Second, third and fourth segments of the antennae shortly pilose, second more than five times as long as the first, about one-third longer than the third, and six times as long as the fourth (unless the latter is shrivelled).

Rostrum not reaching to the middle coxæ. Pronotum truncate behind. Tegmina with the lateral margins comparatively subparallel. Hind tibiæ straight, not pilose.

Length, 8 mill.; width, 2 mill.

Hab.: Peru, Callanga.

9. *Trimoncopeltus simulans* = *Lygus simulans*.—Distant, 1883, B. C. A., Hct., I, 242, Pl. 24, f. 16.

Hab.: Peru, Marpacalla.

Distant's figure and description are both poor. The sulcation of the head is of the feeblest kind; the pronotal callosities are well marked and contiguous, almost forming a second collar. The cuneal notch is not profound. There is no hamus in the wing-cell. The membrane is unicolorous, var. *atrior* nov. Tegmina black, except a long-triangular spot near the apex of the clavus interiorly, lateral margins of corium, basal two-thirds of cuneus, etc., whitish-yellow. Size and locality of the type-form as above.

Fam. Issidæ.

10. *Eurybrachys tomentosa* (Fabr.).—Malabar Coast, Mahe.

The hind femora and tibiæ are concolorous, sanguineous.

THE IDENTITY OF BREPHOS CALIFORNICUS AND B. MELANIS.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Professor Smith attempts to identify these species with forms of *Leptarctia*, and states that his series is not sufficient to enable him to exactly match Boisduval's descriptions. The descriptions can be fairly well matched in specimens before me in the collection of the National Museum, *californicus* corresponding to a form that we have under typical *californicæ*, Walker; *melanis* to darker specimens of *dimidiata*, Stretch. As no two of the eighty specimens before me are alike, it seems scarcely necessary to insist on exactly matching the descriptions. In short, I see no objection to this identification, except the rather serious one that Boisduval, in the same publication in which he described the species of *Brephos*, also described the *Leptarctia*, three forms, as *Lithosia decia*, *L. lena* and *L. adnata*. Is it to be supposed that so good a Lepidopterist as Boisduval would describe the same species thrice as a Lithosian and twice as a *Brephos* in the same paper? Possibly so; but this seems doubtful, and it may be better to hold the *Brephos* names on our lists for a while, much as we should like to dispose of them in the way suggested by Professor Smith.

SYNELIS ENUCLEATA, GUEN.: A CORRECTION.

BY LOUIS B. PROUT, LONDON, ENGLAND.

My attention has been called to Mr. Swett's interesting article on this variable species (CAN. ENT., XXXIX, p. 141). With most of his conclusions I am in entire agreement; indeed, it was I who first called Mr. Taylor's attention to the fact that the name *alabastraria* (not "*alabastaria*"), Hübner, did not belong here at all. There has, unfortunately, been a misidentification of Guenée's type form, which necessitates a further revision. I cannot quite understand what gave Mr. Swett the impression that that author's description referred to the form with dark blotches on both wings, and as to the supposed "type" in M. Oberthür's collection, I may point out that Guenée described from "Six exempl. Coll. Mus. et Gn.," and was acquainted with all the three principal forms. But he describes as typical the form with the transverse *lines only* ("bordées de points noirs un peu oblongs" of course refers to the marginal spots), and distinctly includes in var. A. both the others—"tantôt deux taches à l'angle interne des supérieures seulement, tantôt une double série d'ombres séparées par une subterminale claire, mais ne montant jamais au-dessus de la 1^{re} aux supérieures." As Mr. Swett says, he figures the intermediate form (var. *relevata*, Swett). The extreme form, therefore (*alabastaria*, Hulst, not Hübner, *enucleata* forma typica, Pack, et Swett, non Guen.), has never received a name, and as it seems to be considered worthy of having one, I propose to call it var. *adornata*, nov. I may add that the form *mensurata*, Walk., is not strictly typical, being of a purer white ground colour than the type; and those who wish to name every phase of aberration may add this to the list of separable ones.

Summarized, the synonymical results are:

Synelis enucleata, Guen., = *restrictata*, Walk., et Swett, = *reconditaria*, Walk. (fide Grote) = *continuaria*, Walk. (dirty yellowish-white, no blotches).

A. var. ("ab" in European nomenclature) *mensurata*, Walk. (purer white, no blotches).

B. var. (ab.) *relevata*, Swett, = var. A. Guen., *pars* = Guen., pl. xii, fig. 3 (blotches on fore wings only).

C. var. (ab.) *adornata* mihi, var. nov. = var. A. Guen., *pars* = *alabastaria*, Hulst non Hübner (blotches on all the wings).

MOSQUITO NOTES.—No. 5. (CONCLUDED.)

BY C. S. LUDLOW, WASHINGTON, D. C.

Laboratory of the Office of the Surgeon-General, U. S. Army, Washington, D. C.

This insect was described some months since, but by some error the MS. was not published as I expected, so I now use it as a conclusion to "Mosquito Notes, No. 5."

Ludlowia minima, n. sp.—Head light brown, covered with flat light yellow or yellowish-white scales, two brown bristles projecting forward between the eyes, a few brown fork scales in the nape; antennæ brown, verticels and pubescence brown, and normal; basal joint testaceous, with a few short brown hairs; second and third joints have a few flat brown scales; palpi brown, apical joints missing, those remaining heavily brown-scaled; proboscis brown, tip light; eyes brown; clypeus brown, with "frosty" tomentum.

Thorax: prothoracic lobes testaceous, with a few brown bristles; mesonotum dark brown, partly denuded, but the remaining scales on each insect are dark brown slender curved scales (not hairs) and a few dark brown bristles over the scutellum and wing joint; scutellum with dark brown slender curved scales and brown bristles; pleura light, with a couple of brown spots and a few white scales; metanotum dark brown.

Abdomen light, with dark brown scales and narrow ochraceous basal bands extending laterally as small basal light spots; venter mostly light-scaled.

Legs as a whole brown, but the colour changing with the direction of the light to a light brownish gray; coxæ and trochanters light; femora dark dorsally, ventrally almost white, tiny apical light spots on femora and tibiæ, distally dark, the rest of the joints missing except on hind legs, where the ungues are simple and equal.

Wings clear, densely covered with brown scales, lateral scales broadly lanceolate, median broadly truncate, showing very little if any symmetry; spine-like scales on the costa. Cells not so markedly short as in *Chamberlainii*. First submarginal about $1/7$ long, and nearly the same width as second posterior, both very narrow; stem of former not half as long as cell, and about a fourth shorter than that of second posterior; mid-cross-vein meets supernumerary, and is slightly longer; posterior cross-vein slightly shorter than mid, and about twice its own length distant.

Length, 2.5 mm.

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Male.—Is very like female; fork scales on nape more numerous; antennæ missing; palpi longer than proboscis and clubbed; unguis on fore and mid legs unequal, the larger uniserrate, the smaller simple and comparatively straight; hind legs missing. Wing-cells shorter in proportion, and the stems longer. Length, 3 mm.

Habitat, Carandaugan, Mindanas, Philippine Islands. Taken January 19, 1906.

Neither specimen is perfect, and the male especially is in bad shape, but there can be no reasonable doubt as to the genus, or that the species is new.

Described from one male and one female sent by Lieut. W. H. Duncan, Assistant Surgeon U. S. Army, with specimens of *Chamberlainii*; it is an extremely small mosquito, quite as small as *S. minuta*, Theob., or *S. Amesii*, Ludlow.

NOTES ON RECURVARIA GIBSONELLA, KEARF.

BY ARTHUR GIBSON, OTTAWA.

Early in May, 1905, I collected at Hull, Que., which is just across the Ottawa River from Ottawa, some very small larvæ, each one of which was enclosed within several leaves tied together at the tips of the branches of the common Juniper, *Juniperus communis*, L. From this material I reared three moths, which were submitted to Mr. W. D. Kearfott for examination. Deciding that they were new to science, he honoured me by describing them in the January, 1907, number of the CANADIAN ENTOMOLOGIST under the name of *Recurvaria Gibsonella*.

During the past season some further observations were made on the species. On April 27 I again visited the original locality, and found larvæ very abundant in their characteristic winter quarters. At that time of the year each larva was found in a small tube-like enclosure at the tips of the main branches and side twigs. As many as nine or ten leaves were drawn together and fastened strongly with silk, in the centre of which the nearly full-grown larva passed the winter. As these leaves are dead, or partly so, and discoloured, the hibernaculum is easily found after having once been seen.

In early May a number of localities at and adjacent to Ottawa, where the common Juniper is abundant, were visited, and in every instance larvæ were found in considerable numbers. The species is evidently a common one, and will doubtless be found in many places where the above plant is plentiful.

December, 1907.

Many of the winter homes of the larvæ were examined, and in all the larva was found with the head towards the plant. On May 18th, which was the third warm spring day at Ottawa since about the middle of April, when we had two such days, I noticed that some of the larvæ had revived, eaten their way down through the bottom of their winter case, and were feeding on the nearest green leaves. The whole inside surface of a leaf was eaten, after which the larva attacked other leaves in the same way. During this period a considerable quantity of white silk was spun just beneath but touching the winter home. A few of the leaves were gathered together by the silk.

On June 19 some larvæ were still found by Mr. Kearfott and the writer, and one living pupa in the winter case. At this time it was difficult to see the work of the larvæ on account of the new growth of the plants.

Larvæ collected at the end of April all pupated in their winter quarters, and no fresh food was put in the jar. Moths began to emerge about the middle of June, and continued to issue for a few days. From other material collected later, the moths appeared on June 29 and July 6.

The mature larva is 5.5 mm. long at rest. The head is honey-yellow, shining, slightly bilobed, rather flattened in front; clypeus reaching two-thirds to vertex; mouth-parts and margins of clypeus tinged with lake-red; ocelli black; antennæ short and pale, hairs on face pale. Thoracic shield concolorous with head, shining, wider than head. Body without markings, cylindrical, segments rather deeply divided, colour pale orange, venter paler than dorsum. Tubercles shining, large for size of larva, but inconspicuous, only slightly darker than body. Setæ slender, pale, one hair from each tubercle, anal shield honey-yellow, shining, all the feet whitish; thoracic feet bearing black plates.

The species is single-brooded.

HYLOTOMA SPICULATA.—A CORRECTION.—In the description of this species on page 308 of this magazine, the locality is given as Oak Creek Canon, New Mexico. I am indebted to Prof. T. D. A. Cockerell for pointing out that this should have read Oak Creek Canon, Arizona.

ALEX. D. MACGILLIVRAY.

A FOSSIL TORTRICID MOTH.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO.

Practically nothing is known of fossil Tortricidæ, or indeed of any group of Microlepidoptera in Tertiary times. No extinct Tortricid has been named, although Gravenhorst (1835) referred to the existence of one in Baltic amber, and Menge (1856) reported four larvæ, two pupæ and a moth, supposed to be Tortricids, from the same substance. In the Florissant shales moths are exceedingly rare, and usually not fit to describe; but a fairly good *Tortrix* (sens. lat.) found in the summer of 1907 deserves to be reported.

Tortrix Florissantana, n. sp.

♀.—Length of head and body, 14 mm; head, 1 3/5 mm. wide, palpi robust, probably directed upwards, almost 2 mm. long; antennæ with minute dark dots at intervals; thorax 3 2/3 mm. long, about 3 broad; wings probably striped along the veins, but the scaling appears to have been nearly all lost, except at the apex of hind wings, which are here much darkened; primaries 14 mm. long, the costa very strongly arched, so that the centre of the arch is about 2 mm. distant from the straight line between base and apex of wing; outer margin about 5 mm. long, with a gentle double curve, the concave part uppermost; apex obtuse; inner angle very obtuse, and close to tip of abdomen when the wings are folded backwards; lower margin about 10 mm. long.

Hind wing about 10 1/3 mm. long, the apex considerably less than a right angle; frenulum distinct, of two strong bristles; a part of the venation of the hind wing is visible; what appears to be the fork between the media and cubitus is about 4 mm from tip of wing; the second cubitus and first anal are also seen, normally placed.

Florissant, Colorado, in the miocene shales, Station 14 (*W. P. Cockerell*). The insect as preserved is pale yellowish-red; the wings are directed backwards, as in repose. The arched costa and gently curved outer margin, without any suggestion of a projecting point, indicate Tortricid rather than Pyralid affinities, and I think the family reference is reasonably safe. The generic term is of course used only in the old broad sense.

Mailed December 7th, 1907.

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