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The Canadian Entomologist.

VOL XXVIII. LONDON, NOVEMBER, 1896.

No. 11.

BUTTERFLIES TAKEN AT ORILLIA, ONT.

BY C. E. GRANT.



FIG. 23.

I have been collecting Lepidoptera in Orillia and its vicinity for over thirty years, off and on, and thinking that it would be of interest to my brother collectors to have an idea of the fauna of this district, I send you a list of the diurnal Lepidoptera taken by me as far as identified.

Danaus archippus.—Common from June 5th to October.

Argynnis atlantis.—Common from June 4th to August.

" *cybele*.—Common from June 16th to August 31st.

" *aphrodite*.—Not so common, from June 23rd to August. One specimen of *Argynnis* taken by me presented a very dark appearance, nearly black, on the basal portion of the wings, with a greenish tinge on the outside edge of dark base, supposed to be a melanic female of *cybele*.

Argynnis myrina.—Common; two broods, June and August.

- Phyciodes tharos*.—Forms *marcia*, *morpheus* and other varieties common May 24th to July.
- Phyciodes nycteis*.—Fairly abundant; one brood in June.
- " *Batesii*.—One specimen taken in July.
- Grapta interrogationis*.—Forms *umbrosa* and *Fabricii* common. There are three broods here.
- Grapta comma*.—Forms *dryas* and *Harrisii* both fairly common.
- " *progne*.—Common all the season.
- " *gracilis*.—Two specimens taken in July on *Asclepias*.
- " *faunus*.—Rare.
- " *j. album*.—Common some seasons in September.
- Vanessa antiopa*.—Common.
- Vanessa Milberti*.—Common. I think there are three broods.
- Pyrameis atalanta*.—Usually common in spring. This year remarkably abundant in first week of August. Saw hundreds on August 6th; took six at one sweep of the net; since then have not seen one.
- Pyrameis huntera*.—Not uncommon in August.
- " *cardui*.—Generally common. Have not seen any this year up to this date, August 31st.
- Limenitis arthemis*.—Not very common in June. Very few this year, but of remarkably large size.
- Limenitis disippus*.—Moderately common. Second brood in July and August in low lands.
- Debis portlandia*.—Two specimens taken near Coldwater, on Matchedash Bay, in August, 1883.
- Neonympha canthus*.—Common in low meadows in July.
- " *curytris*.—Very common in open woods in June.
- Satyrus nephele*.—Taken occasionally in July. Not seen of late years.
- Thecla acadica*.—Usually three or four in a season in July. Very plentiful this year. Took forty specimens.
- Thecla titus*.—Also common this season; usually rather scarce in July.
- " *strigosa*.—Have taken one or two every season in July.
- " *calanus*.—Rather rare in July.
- Feniseca tarquinius*.—Moderately common through the season in one locality.
- Chrysophanus thoe*.—Also very local, but not uncommon when their habitat is known. Two broods, end of June and end of August.

- Chrysophanus hypophleas*.—Common all the season.
- Lycæna pseudargiolus*.—*Lucia* very common in April and May. *Neglecta* not so abundant in July and August.
- Pieris oleracea*.—Spring type common in April and May. Summer form also. Have also taken *virginiensis*.
- Pieris protodice*.—Common years ago. One male taken last year in August.
- Pieris rapæ*.—Everywhere abundant.
- Colias eurythema*.—Common in 1872; not seen here of late years.
- " *philodice*.—Abundant. Also albinic female occasionally.
- Meganostoma cæsonia*.—Quite common this year from June 6th to July 13th. Only one specimen taken before, about thirty years ago.
- Papilio turnus*.—Generally common in May, June and July; scarce this year. Have taken a specimen of a melanic male similar to one figured in CANADIAN ENTOMOLOGIST some years ago by Dr. Fletcher. (Fig. 23.)
- Papilio æsterias*.—Formerly rather common; now scarce.
- " *cresphontes*.—Has been taken in Orillia, but not by myself.
- Pamphila zabulon*.—Forms *hobomok* and *pocolontas* common in May and June; one brood.
- Pamphila mystic*.—Common in June and August; two broods.
- " *cernes*.—Very abundant in June. Second brood scarce in August.
- Pamphila peckius*.—Also common; taken in June and end of August.
- " *metacomet*.—Rather scarce in July.
- Nisoniades juvenalis*.—Not uncommon in May and June.
- " *icelus*.—Not uncommon in May, June and July.
- " *brizo*.—Scarce; two or three specimens.
- " *lucilius*.—Scarce.
- Eudamus pylades*.—Abundant end of May and June.
- " *tityrus*.—Not abundant, in May, June and July; and a specimen which I take to be *Eudamus bathyllus*, but of which I am not sure.
- Pholisora catullus*.—Taken sparingly in June.

This comprises all the local diurnals which I have found in this district, except one or two species of *Pamphila* which I am unable to identify, making fifty-three or fifty-four species. I have about 200 species

of Noctuidæ and 100 or so of Geometridæ, etc., but having had no chance of seeing other collections, from the present state of literature I cannot identify a great number.

I should like very much if some of your readers could give me the life-history of *Brephos infans*, particularly as to the time of flight. I have taken this rare moth when a boy, and knew enough to mention that it was caught "at birch trees in May," but neglected to note whether it was day or night, and I cannot remember now. I have several other rare captures, and some day might report them if you think it would interest your readers.

[NOTE.—*Brephos infans* is a day flier, and from its irregular flight, as well as its colour, is very difficult to follow. The larva feeds on birch.—ED.]

NOTES ON THE PREPARATORY STAGES OF EREBIA EPIPSODEA (BUTLER).

BY H. H. LYMAN, MONTREAL.


In Part IX. of the 3rd series of Edwards's Butterflies of North America is given a very full and beautifully illustrated history of this species from the egg to imago; but as I have bred this species during the summer of 1895, through all its stages, and as the life-history, as worked out by me, differs in certain important particulars from that recorded by Mr. Edwards, I think it advisable that I should give my experience in the rearing of this very interesting species.

On 4th of July I received from Mr. J. A. Guignard, Assistant Botanist and Entomologist of the Central Experimental Farm at Ottawa, a number of eggs which had been sent to Dr. Fletcher by Mr. T. N. Willing, of Olds, Alberta; Dr. Fletcher having left for an extended trip through the Northwest Territories and British Columbia. The eggs were hatching when received, and their colour could not, therefore, be ascertained. They had been sent on 24th June, and the egg period, supposing them to have been laid the day before they were mailed, would be, thus, 11 days. No intimation was given me as to the species, but I afterwards received from Mr. Guignard a specimen of *E. Epipsodea*, which had been sent along with the eggs, and was doubtless the one that laid them.

Egg.—Height, 1.06 mm.; diameter, .89 mm.; very much of the general shape of that of *C. Jutta*, as figured in Scudder's Butterflies of New

England, pl. 64, fig. 2. Slightly widest at one-third from base. Ribs about 22-24, well marked, but not very prominent, and with many cross ribs, as in Scudder's figure of that of *Satyrus Alope*, fig. 3 on the same plate.

Young Larva.—Head large, pale brownish, pitted with many small depressions, which are darker, and ornamented with a number of brown spots, which are arranged as follows: four on the summit, two near together towards the front, and two further apart behind, below these a row of six, and a few minute ones lower down; the ocelli black.

Body.—Length, 2.5 mm.; pale in colour, with a dorsal, three subdorsal, a lateral, and a subspiracular stripe of brown. Second segment has about ten minute tubercles in a row, some smaller than others, and one on each side in the subdorsal region in advance of the row. On each segment, from 3rd to 12th, inclusive, there are six small tubercles above, arranged , and also several smaller ones on each side rather low down. All the segments except 2nd and 13th are divided by three transverse wrinkles.

On 10th several were seen to be swollen for first moult, but others continued to feed. On 12th ten were counted, and all but one seemed ready for first moult. In the evening one was seen to have passed the moult, several more passed on the 13th, and by the 14th all in sight had passed the moult, the average length of first stage being thus nine days.

After First Moult.—Length, 4.7 mm. Head rather large, exceeding the 2nd segment, brownish-green. Body tapering pretty evenly to anal extremity, which now terminates in two blunt points, as stated and figured by Edwards. The head is pitted as before and covered with clubbed tubercles. The body tubercles are very numerous, short, curved towards tail, and slightly clubbed. Towards the tail they get longer and are hardly clubbed. I could not discern any difference between those on the 2nd and 3rd segments. The tubercles are translucent brownish-green or pale in colour, and spring from brown spots. Body pale yellowish with a tinge of green. There is a dorsal stripe of dark brown, and a subdorsal and two lateral brown stripes, the lower being just above the spiracles. The next one above is wider than the others and diffuse on lower side. Spiracles are dark brown or black. The basal ridge is yellowish, and below it there is on the 5th to 12th segments, inclusive, a brown oblong spot, described by Edwards as a continuous stripe. Venter and prolegs brownish-green, speckled with brown dots; feet greenish.

Length of second stage about nine days.

On 21st July one was found to have passed second moult.

After Second Moult.—Length at rest, 7.8 mm. Processes innumerable. Shape as before, tail as before; head as before, very rounded, exceeding the second segment, light horn coloured, translucent, much pitted. Colour of body, yellowish-brown. A strongly marked dark brown or black dorsal stripe, bordered with creamy colour, three brownish lateral stripes, the upper one light brown, the middle one dark brown with a light brown shading below, the lowest one light brown and very little separated from the shading of the middle one. Spiracles small, ringed with brown. Subspiracular ridge strongly marked and below it a dark brown stripe. The sockets of the prop-legs and feet margined with brown. Venter, prop-legs and feet of same light horn colour as above, the feet and legs speckled with brown dots.

On 31st July one which had lagged very much was found partly past second moult, but dead; one still lingered, not having moulted; several were nearly ready for third moult. On 2nd August one was found just past third moult, and the second moulted on the 3rd.

Length of third stage was thus about twelve days.

After Third Moult.—Length, 11.46 mm. Edwards says .38 inch. Colour is greenish-brown, and the only difference I could see was that the upper lateral or subdorsal stripe is darker than before. The third larva moulted soon after 3rd August, and the fourth on 8th August and fifth on 13th August.

After third moult they increased very rapidly in size and became very plump, as I supposed, preparatory to hibernation, as Edwards described four moults, but I soon recognized that they must be about to pupate.

Mature Larva.—Length, 20.3 mm.; pale greenish-horn colour; tapers to both ends.

Head rather small, pale horn-colour, thickly and minutely pitted with brown. Dark brown dorsal stripe, bordered with creamy colour. The other stripes rather faded out and indistinct. Rather more than half way to the spiracles there is a creamy stripe margined below with brown and with a slight brownish atmosphere above. The spiracles are dark brown and very small, and just above them there is a pale creamy line. The subspiracular fold is strongly marked, but the dark line below it has almost disappeared and is only represented by a slight shading. Before

pupation the larva becomes of a rather dirty greenish-white colour, very plump, especially about the middle. The larva, when contracted for pupation, lies curved on its back among the grass without any attempt at spinning^g silk, just as Edwards figures it. First one pupated 15th Aug., the second on the 17th, the third on the 18th, the fourth failed to pupate and died, the fifth pupated on 29th.

The fourth stage was thus from thirteen to sixteen days.

Pupa, when first formed, is of a creamy colour, very similar to that of the grub of a *Tachina* fly when it has just emerged from the body of its victim before it contracts and hardens into the puparium. The brown markings appear in the course of an hour or two, and the description is then as follows :—

Pupa.—Length, 11.7 mm. Pale horn colour, streaked and spotted with dark brown; cylindrical; abdomen stout, conical, with a slightly curved, pointed tip. The abdominal segments are margined with brown, especially at the sides, and are also spotted with brown. The spiracles are orange. There are brown stripes in the interspaces of the wings, and the antennæ, tongue and feet-cases are also marked with brown.

The first pupa was seen to be black, and the wing markings showing on 27th Aug., and it emerged early on the 28th, and was a ♀; the one that pupated on 17th gave the imago, a ♀, on 29th; the one which pupated on 18th gave the imago on 30th, and the one which pupated on 29th Aug. gave the imago on 9th Sept.

The pupal period thus varied from thirteen to eleven days.

The average of the first three gives a period from oviposition to imago of from sixty-eight to seventy days.

The points in which my observations chiefly differ from those of Mr. Edwards are :—

First : As to the egg which Mr. Edwards describes as having thirty-five ribs, while my count gave in one case twenty-two and in another twenty-four, it was impossible for me to get all the eggs which I had into a position where the ribs could be counted, but I thought that two out of about a dozen should yield a fair average. It is true that there is variation in the number of ribs in the same species and even in the same individual, but the difference between twenty-four and thirty-five seems hard to account for.

Second : Edwards describes four moults, the larva hibernating after either second or third moult.

I think it quite possible that when the larva hibernates there may be a fourth moult, and it is probable that those of mine which completed their changes in one season had their stages hastened by being reared under more southerly conditions. Several of my larvæ fed comparatively slowly after third moult, as though trying to hibernate, but most of them died. The last was sent to Dr. Fletcher to see if he could carry it over the winter successfully, but it perished.

There can be no doubt of the accuracy of my observations, as I had only a few larvæ, which were under constant observation, and I preserved the cast faces, which give measurements as follows, according to the micrometer eye-piece of my microscope: 8, $12\frac{1}{2}$, $18\frac{1}{2}$, 28. These reduced to millimetres and decimals are as follows: .666, 1.041, 1.542, 2.333. As the faces were not of the same individual, but were simply taken at random from all those preserved, the measurements come as close to the theoretical progression as is to be expected.

I wrote to Mr. Willing to ask if he had ever noticed a second flight of *Episodesa* at Calgary, as I thought it possible that there might be at least a partial second brood, but he replied that he had never noticed any such flight. Finding my experience so different from that described by Mr. Edwards, I consulted all the literature at my command to see if I could obtain any light on the questions of the normal number of ribs in the eggs and of moults in the larvæ of this genus, but with absolutely no success.

AELLOPOS TITAN (CRAM.).

In the CANADIAN ENTOMOLOGIST, Vol. XXIII, p. 41, Mr. Moffat records the capture of the above rare moth at Grimsby, Ont., and adds that it is possibly the only Canadian specimen in the country.

Another Canadian specimen of this visitor from the tropics was taken about four years ago at Cushing, P. Q., a village in the Ottawa Valley, not far from Lachute.

This specimen is now in my collection, and seems to be unusually large, expanding 2.6 inches. The discal spot of primaries is quite distinct. The transverse straight, whitish band only extends half across the wings, and consists of three rectangular spots, and the submarginal band consists of five large lunules. The terminal space is slightly paler than the rest of the wing, and there is no trace of the spots or bands.

Westmount, P. Q.

A. F. WINN.

THE GYPSY MOTH IN MASSACHUSETTS.

[A discussion on the work of its extermination, at the eighth annual meeting of the Association of Economic Entomologists, Buffalo, August 22nd, 1896.]

REPORTED BY A. H. KIRKLAND.

At the eighth annual meeting of the Association of Economic Entomologists, held at Buffalo, August 21st and 22nd, 1896, a part of one session was devoted to the consideration of the work of exterminating the gypsy moth in the Commonwealth of Massachusetts. The subject was presented for discussion by the President, Prof. C. H. Fernald, at the morning session of the second day. Prof. Fernald referred to the action of the Association at its Springfield (1895) meeting, and stated that at the legislative hearings of the past spring, held with reference to determining the size of the appropriation to be granted for continuing the work of exterminating the gypsy moth, no representations made by the Gypsy Moth Committee, the Director, or himself, carried a fraction of the weight that the endorsement of the Association afforded. The legislators recognized the Association as a body of eminent scientists, and accordingly valued the opinion of its members.

In speaking of the present condition of affairs brought about by the failure of the Legislature to provide sufficient funds for the continuance of the work in the most approved manner, the Professor stated that future action must be along one of three lines :

(1) To continue the work with a view to *extermination*. This can be done, but will involve a vast outlay.

(2) To attempt the *control* of the insect, but with no idea of its ultimate extermination. This means a great annual expenditure that must be continued indefinitely.

(3) To abandon the whole work, "let the insect spread at its own sweet will," and trust to the property owners to care for their own estates. Should this latter course be adopted, it would be impossible to say how long a period of time would elapse before the pest would spread over the whole of New England and into adjacent territory. The insect is now in a condition to spread rapidly through avenues of traffic, and its diffusion over the whole country would probably be a matter of comparatively short time.

The committee in charge, and those directly connected with the work, have been criticised because the importation of parasites has not been attempted. This, the Professor explained, had not seemed wise while the work has been carried on with a view to extermination, since

the latter condition involved the destruction of all large colonies wherever they occurred, and would thus prevent the successful breeding of parasites. Such insects would require the most favourable conditions in order to become acclimatized, and this would necessitate the preservation of large colonies of the gypsy moth as food for the parasites. Should the work of extermination be abandoned, a careful study of the natural enemies of the gypsy moth in its native home would be advised.

At the request of Professor Fernald, Director Forbush gave an account of the progress made in the gypsy moth work and its present condition. He said that when this insect, which was introduced into Massachusetts more than twenty-five years ago, first became seriously destructive, a commission was appointed by the Governor to "prevent its spreading and secure its extermination." This commission found that the territory infested by the moth was much larger than had been supposed. The commission was superseded the next season by another, which in a short time was abolished, and the work was then turned over to the State Board of Agriculture.

The work was begun under a grave misconception of the amount of territory infested. As soon as the State Board assumed the direction of the undertaking, it was found that the infested territory extended, not, as believed by the first commission, over a small and well-defined area, but, instead, over some thirty cities and towns. The size of the infested territory as considered by the first commission, compared with the actual area later found to be infested, was very aptly illustrated by the comparison of the size of a silver dollar with that of a broad-brimmed hat.

With a region of two hundred and twenty square miles to be examined and cleared of the moth, the appropriations made the first two years proved entirely insufficient to do more than to destroy the larger swarms of the insect and clear them from a few of the towns on the periphery of the region. The two years' work demonstrated, however, to those in charge that the moths could be cleared from any given territory provided ample appropriations could be secured to organize, equip and train a sufficient force of men. The season of 1892 was rather unfavourable for the multiplication of the moths, and so much progress was made during that year that ten towns appeared to have been entirely cleared of the moth. The committee in charge of the work believed the time had come to strike a decisive blow. The Director and the Entomologist went carefully over the ground and estimated the cost, recommending in their

report to the committee that a large appropriation be granted by the Legislature for immediate use. The Legislature cut down the estimates for the appropriation, and granted only one hundred thousand dollars. Thus the best opportunity in the history of the work was lost. During the past three seasons the meteorological and other conditions seem to have been particularly favourable for the increase of the gypsy moth, and no such favourable opportunity for its complete extermination has offered as was presented in 1892. From that time until the present, although large sums have been annually appropriated, aggregating altogether more than half a million dollars, each appropriation has been far less in amount than the immediate necessities of the work required, and each has been granted so late in the season that it has been impossible to accomplish the desired results. This ineffective legislation has been, no doubt, the result of an organized opposition on the part of those who do not believe in the possibility of extermination. Considerable opposition has come from farmers, people who are benefited, perhaps, more than any other class by the policy of the State in making appropriations for this purpose.

Many of the worst swarms of insects have been entirely exterminated, and the work has been so effectively done in most of the outer towns of the infested region that the moth has been cleared from these towns so far as careful inspection could determine. But during the present year, the appropriation having been delayed nearly six months, the caterpillars in the central towns hatched and became again somewhat generally distributed over the region, thus reinfesting some of the places originally infested and also originating new colonies.

Few moths have ever been observed outside the region found infested in 1891, except in one or two isolated localities, and all the moth colonies found since 1891, outside these thirty towns, had evidently been in existence for several years when discovered. None have been found at a distance from the infested towns. Since work was begun the present year the progress made has been very encouraging. The numbers of the different forms of the moth found this year have so far been much less than those found in 1895. No moths have been found in the extreme north-easterly towns, such as Danvers and Marblehead, and very few have been found in Lynn, a city which formerly had more than twelve hundred infested localities.

Mr. Forbush expressed a desire for information concerning the death of trees from defoliation by insects.

Prof. J. B. Smith inquired whether or not the infested territory had been reduced.

Mr. Forbush replied that the chief reduction had been made on the outside, but that many colonies had also been exterminated in the centre of the region. The greatest progress was made during the first and second years of the State Board work. There had been cases of re-infestation of "exterminated" territory from larvæ brought from the infested centre.

At the request of Prof. Fernald, Mr. Kirkland spoke briefly of the experimental work of the past year. He stated that two main lines of investigation had been followed: experiments with insecticides and the study of natural enemies. In conjunction with the chemist who prepared the compounds, a large series of arsenical preparations had been tested. Experiments with Paris green and correctives to prevent burning gave negative results. Sulph-arsenates did not give results superior to arsenites. Experiments with arsenite of lead versus arsenate of lead had shown the two poisons to be about equal in insecticidal properties. The former is somewhat heavier than the latter, and does not stay in suspension as well. The experiments with barium arsenate had already been described.

Of the few hymenopterous parasites taken, *Pimpla pedalis* and *P. tenuicornis* had been reared in small numbers from *Porthetria dispar*. The first brood of these insects attacks the *Clisiocampa americana*, and the second brood emerges in time to prey somewhat on *P. dispar*. The work on life-histories of the predaceous beetles had been carried out by a man especially detailed for the purpose, Mr. A. F. Burgess, and much valuable information obtained.

Many predaceous Heteroptera of the genera *Euschistus* and *Podisus* had been reared and studied by Mr. Kirkland, and many doubtful points in their life-history cleared up. These insects when emerging from their hibernating quarters attack the larvæ of the tent caterpillar, *Clisiocampa americana*, in great numbers.

The Japanese parasite of the gypsy moth had been received from Rev. H. A. Loomis, Yokohama, but the cocoons of the parasite were infested by a secondary parasite. Only a few of the primary parasites were alive when received, and these died without attacking gypsy moth larvæ ("enfeebled"). This Japanese parasite would be worthy of careful study should the work of exterminating the gypsy moth cease. The

experimental work of the Gypsy Moth Committee has suffered from the effects of the same shortsighted legislative policy that has hindered the progress of field operations. Mr. Kirkland pointed out that often the expenditure of a small sum in experimental research gave valuable results, and regretted that the experiments on the gypsy moth had been made to suffer from lack of funds.

In discussing the above remarks, Prof. A. D. Hopkins highly commended the good work that had been done in destroying the gypsy moth, but expressed the opinion that extermination would not be accomplished, owing to the lack of financial support on the part of the Legislature.

Prof. J. A. Lintner advocated the advisability of extermination, and stated that it was his opinion that if the State would grant sufficient funds, extermination would be accomplished. He thought the time had come when Massachusetts should be aided by the financial support of the National Government. He contrasted the action of the Government concerning the Rocky Mountain locust invasions with its present inaction as regards the gypsy moth. National support would also inspire the Massachusetts people with more confidence.

Dr. James Fletcher spoke in very flattering terms of the success in extermination thus far obtained, and of the value of the special report on the gypsy moth to entomologists in general. This book he considered would be an invaluable work of reference for economic entomologists.

He had been in the infested region twice and knew that the work had been well done, and this in spite of difficulties arising from insufficient means. In answer to a question by Dr. Fletcher, Mr. Forbush made a more explicit statement concerning the progress of the work and the conditions governing the same. He cited the case of the city of Lynn, where over one thousand colonies of the gypsy moth had been exterminated.

Dr. Fletcher suggested that the Association should give formal expression of its opinion regarding the attempt being made by the State of Massachusetts to stamp out this pest.

Prof. J. B. Smith stated that New Jersey devoutly hoped that the insect would be kept within its present domain, and offered resolutions commending the work already accomplished by the State of Massachusetts, and urging the continuance of the same, with liberal financial support.

Prof. F. M. Webster seconded Mr. Smith's resolutions, and the same were carried by a unanimous vote.

NEW SPECIES OF NOMADA AND CHYPHOTES.

BY T. D. A. COCKERELL, MESILLA, N. M.

The two following descriptions were intended to be included in articles discussing at some length the *Nomada*, spp., of New Mexico, and certain Mutillidæ; but poor health having caused these to be indefinitely postponed, the descriptions are presented herewith.

Nomada gutierrezie, n. sp.—♀. Length, 7 mm.; stout, ferruginous with cream-coloured markings. Pubescence practically confined to a slight hoariness around the bases of the antennæ, on pleura, on metathorax (except enclosed portion), on legs, and the hindmost half of the abdomen. Head considerably broader than long, face flat, punctures close on front and vertex, more sparse on face; lower margin of clypeus forming a slightly raised rim; mandibles dark at tips, with an obscure pale yellow spot near base; ocelli on a dark patch, closer together than the diameter of either; pale face-markings confined to a broad cream-coloured stripe on each side, extending from (but not on to) the clypeus to a short distance before the summits of the eyes, broadest at its lowest end. A small light spot behind each eye at the top. Antennæ ferruginous, with the flagellum becoming blackish; first joint of flagellum about as long as second and third together; second and third about equal. Mesothorax and scutellum with very large but not particularly close punctures, scutellum distinctly bilobed; enclosed space of metathorax bare, very minutely lineolately sculptured. Tegulae shining, sparsely punctured, apricot colour. Hind border of prothorax, tubercles, oval spot on hind part of pleura, scutellum except a dark central shade behind, and postscutellum, cream colour. A small yellow spot also immediately in front of each anterior angle of scutellum. Legs ferruginous, a creamy dot at end of hind tibiæ, and line on first joint of hind tarsi. Claws very deeply cleft. Wings hyaline, with a fuliginous shade commencing along basal nervure, extending through the upper part of the first discoidal cell, all the submarginals and the marginal, darkening at the end of the marginal, and ending in a large suffused apical shade, between which and the third submarginal is a clear space. Nervures piceous, stigma ferruginous. Third submarginal cell narrowing more than half to marginal. Abdomen very finely and closely punctured; first segment with a creamy band, about twice as wide at sides as in middle; second segment with a creamy band, as narrow in middle as that on first, but rapidly widening laterally, where it is at least twice as broad as that on first. Third segment with a cream-coloured spot on

each side; fourth with a band, hidden by the overlapping third segment; fifth with a broad band. Apex with a fringe of dark hairs. Venter ferruginous, immaculate.

Hab.—Mesilla Valley, New Mexico, about a mile south-east of the Agricultural College, on *Gutierrezia sarothrae*, var. *microcephala*. October 5, 1895.

Apparently nearest to *N. zebra*, Cress., but differs by the immaculate venter, etc. Mr. E. Saunders remarks (in litt.) that in the European *Nomadæ* the first joint of the flagellum is generally extremely short, often scarcely visible. This seems not to be usual with our species.

Chyphotes mirabilis, n. sp.—♀. Length, about 11 mm.; head rounded, about as big as anterior part of thorax; eyes hemispherical or bean-shaped. Antennæ gradually tapering to a very fine point, scape stouter than flagellum, funicle hardly apparent. First joint of flagellum half length of second. Mandibles with a small tooth within. Maxillary palpi 5-jointed: labial palpi apparently 3-jointed. Thorax narrow, deeply constricted in middle, hind portion longest. Intermediate tibiae with two spurs. Tarsal joints tipped with whorls of spines. Abdomen shaped much as in *Photopsis*, first segment rounded, its suture with the second deeply constricted, its base rapidly attenuate to a narrow petiole. Surface of abdomen with close shallow punctures, becoming subcellate. Colour dullish chestnut-red, tips of antennæ darkened, tarsal spines black, tibial spurs dull white. The head and the anterior portion of the thorax are densely covered with appressed pale golden pubescence, on dorsum completely hiding the surface. Intermingled with this are a few erect black hairs. Remaining parts of the body visible, some sparse pale pubescence on sides of hind part of thorax, on legs, and sides of abdomen; hind coxæ with a small patch of dense pale pubescence, hind margin of first abdominal segment broadly but irregularly covered with silvery hairs, hind margin of second segment with a pair of silvery hair patches, overlapping third; and the same, less developed, on hind margin of third. In addition to the above, there are everywhere sparse erect black hairs, which are more abundant at the sides of the abdomen towards the tip.

Hab.—Mesilla Valley, N. M. One on campus of the Agricultural College, July, 1896.

I have given generic as well as specific characters in the description, as this remarkable insect may form the type of a new genus, or at least a subgenus.

A. A. A. S.

ENTOMOLOGY IN SECTION "F," BUFFALO MEETING.

The interest in Entomology at the Buffalo meeting of the American Association for the Advancement of Science was fully up to the standard of former years. Two days preceding the date of meeting — Friday and Saturday, August 21st and 22nd — were fully occupied in the reading and discussion of papers by the Association of Economic Entomologists. The entomological papers assigned to Section "F" were arranged to be read the first day of papers (Tuesday), and nearly the whole day was thus occupied. The following entomologists were present at the sessions of the Section: L. O. Howard, C. L. Marlatt, F. M. Webster, J. A. Lintner, Jno. B. Smith, A. D. Hopkins, E. P. VanDuzee, C. W. Hargitt, Jas. G. Needham, Agnes M. Claypole, and D. S. Kellicott.

The papers read are briefly summarized below:—

1. Dr. L. O. Howard, United States Entomologist, read a paper on the entomological results of the exploration of the British West Indies by the British Association for the Advancement of Science, detailing the steps by which this important investigation had been brought about and summarizing the results of the different papers which have been published since the beginning of the investigation. He eulogized the British Committee for its conception of the work and the liberality with which it has been carried on, showed the importance of the results so far achieved, and made a plea for the association of entomologists with scientific expeditions in this country, and for the close collecting of insects, which has apparently been heretofore considered as of less importance than the collection of higher animals and plants.

After discussion by Dr. Theodore Gill, in which he pointed out that the West Indies were not islands in a faunal sense, but parts of South America, etc., simply separated by narrow channels of water, the same author read the second paper.

2. "A Case of Excessive Parasitism."—He described in some detail the facts concerning the rearing of one hundred and twenty-seven specimens of six species and five genera of Chalcididae from the Lecanium scales on a twig of arbor vitæ received from Ottawa, Can.

3. "On Life Zones in West Virginia."—A. D. Hopkins detailed the work in mapping the life zones in the mountains of West Virginia. The paper was discussed at length by Dr. Smith, Dr. Lintner, and Dr. Howard. It was elicited that very much careful work in the line of the

paper remains to be done before the maps can be more than tentative. Dr. Smith called attention to the fact that the geological formations often mark sharp transitions in the distribution of insects and also in life histories. He cited the fact that on one border of a certain formation in New Jersey the elm-leaf beetle and codling moth are single-brooded and on the other double-brooded.

Dr. Howard called attention to the fact that locality labels by States were unreliable for West Virginia.

4. A fourth paper by F. M. Webster, entitled "Warning Colours, Protective Coloration, and Protective Mimicry," was read and discussed at length.

The paper treated of cases among insects where a species unarmed and in no way capable of protecting itself, was, to a certain extent, protected by its resemblance to armed species, or such as are known to be distasteful. Others, by their actions, mimicked the movements of certain other species, and were thereby mistaken for such as are inedible. The ground was taken that birds, after learning that certain insects were not fit for food, would shun any other insects appearing like these, wherever they might come in contact with them, even though at a different season of the year. There may be cases where one species mimics another, when the enemy has become exterminated and no protection is needed. Caution was enjoined against hasty and immature conclusions, as there is much to be learned in the matter, but facts should not be cast aside as mere coincidences when more information would enable us to push the problem to a point nearer a solution. That insects, especially, gain protection from their coloration and movements is assured, but much caution is necessary before conclusions are reached. The paper was illustrated by specimens.

5. "On the Variations of certain Species of North American Odonata," by D. S. Kellicott, was a brief study of certain of our common species. Attention was drawn to the fact that species were not always separated even by authorities in the group; that when distinct species are separated from their confrères by such very slight differences of structure and coloration it is necessary to carefully record the variations of even our commonest species. The species reported were *Enallagma carunculatum*, Morse, found in collections, until Morse pointed out its distinctness, under the label of *E. civile*, Hagen., and the Gomphines, *G. fraternus*, Say, and *G. externus*, Selys. The first was found to be in

Ohio very constant in size: abdomen, ♂ 27 mm., ♀ 27.3 mm; hind wing, ♂ 19.9 mm., ♀ 21 mm. The postocular spots were found to vary from long, narrow, wedgy, connected, to short, ovate, disconnected. Other markings usually employed in descriptions were found to vary greatly. The superior appendages of the male were found to be constant in length compared with the tenth segment, and in pattern.

Gomphus fraternus and *G. externus* were studied by B. D. Walsh and the details and comparisons published in the *Proceedings of the Ent. Soc. of Philadelphia*, Volume II. In regard to the former he says there is no slender thorn in the vertical vesicle of the female. These the author found always present, to be long and slender, and to vary in colour between wholly black and wholly yellow. The yellow vitta on the hind femur of the female, claimed by Walsh to be a distinguishing character, was found to be present in about one-half the individuals and wholly wanting in one-fourth. In *externus* the spine of the vertex is present. It is a short, dark cone. The vitta on the posterior femur varies much as in *fraternus*. The conspicuous vitta on the ninth abdominal ring of *externus*, male, varies as follows: In about nine cases in ten it is normal; *i. e.*, extends the entire length of the segment, broad, and orange in colour; one in ten has it faint and narrow. An occasional male of *fraternus* has a similar faint vitta on nine.

In size both species were found to be exceedingly constant and larger than the measurements given by Baron de Selys. *Externus*: Abdomen, ♂ 40.3 mm. (average of ten); ♀ 39.3 mm. (average of three). Hind wing, ♂ 32.5 mm; ♀ 34 mm. *Fraternus*: Abdomen, ♂ 36.8 mm. (average of ten); ♀ 37.2 mm. (average of ten). Hind wing, ♂ 30.9 mm.; ♀ 31.5 mm.

Other discrepancies were pointed out in Walsh's description of the female of *externus* (*consobrinus*) and a question raised as to the accepted conclusion that *consobrinus*, Walsh, is after all a synonym of *externus*, Selys.

6. A second paper was read by Dr. Kellicott, "On the Occurrence of Dragonflies in Ohio in 1896." The seasons of 1894 and 1895 were those of extreme drought. Ponds and streams went dry for weeks over wide areas. A dearth of Odonata was looked for in 1896. This has not been the case; on the contrary, there has been an extreme abundance. No species heretofore known to abound has been missed, whilst several not before noticed have occurred, widespread and numerous. It would

appear to follow that the nymphs may bury themselves in the mud and remain in the dry capsules for a long time unharmed until rains return. Cases were cited of *Diplax rubicundula* and *D. obtrusa* industriously ovipositing among the grass of a dried-up pond, and of *Lestis triangularis* ovipositing in plants in similar places.

Mention was also made of the capture of more Southern species in the Maumee Valley.

7. A valuable morphological paper was presented by Miss Agnes M. Claypole, of Wellesley, Mass., on "The Appendages of an Insect Embryo." The form used was identified as *Anurida maritima*, Guerin, and was collected under stones on the beach at Woods' Holl, Mass. It belongs to a wingless group of Insecta, the Collembola, and is the first form of the group as yet studied in microscopic sections.

The cleavage of the egg is complete, holoblastic, a character belonging to this group of insects only, all the others having central cleavage. The appearance of the appendages takes place very early, the antennæ being the first of the series; following the antennæ is a pair of very small appendages on the body segment, carrying what is well known to be the third brain segment. Behind these, the mandibles, 1st maxillæ, and 2nd maxillæ appear successively, in turn followed again by the thoracic appendages. All of these organs increase in size excepting the small pair on the third segment, which remain unchanged till the mouth-parts and antennæ have assumed almost distinctive characters. Then these small ones begin to grow as a ridge down each side of the three pairs of mouth-parts and finally form a wide platelike appendage enclosing the mandibles and second maxillæ entirely. In the adult the mouth-parts are known to be enclosed in a tube, or to be "drawn in," as the condition is usually described.

If, as is generally acknowledged, the insect antennæ are considered homologous with the first pair of antennæ of the Crustacea, a point of considerable interest is developed. The appendage of the third brain segment has been found in many insect embryos, but in all cases is a purely embryonic structure; it disappears before hatching. Among terrestrial Crustacea—the wood lice, for example—the second pair of antennæ is reduced to an extremely small size. Hence *Anurida* is an interesting form showing an insect in which the second pair of antennæ of the Crustacea is present, and functional in the adult; the function, however, is completely changed.

D. S. KELLICOTT,
Secretary Section F.

MISS G. E. ORMEROD.

It is with deep regret that we record the death of Miss Georgiana Elizabeth Ormerod, of Torrington House, St. Alban's, England, the elder sister of Miss Eleanor A. Ormerod, whose name as a distinguished entomologist is known throughout the scientific world. After several months of patiently-borne illness, she passed away on the 19th of August last, full of piety and good works, and justly esteemed and loved by all who knew her. She and her sister were each other's constant companion and fellow-worker, and each sought the other's counsel and aid in carrying out any plan of work in which she was engaged. Miss G. E. Ormerod's special studies were botany and conchology, and in the latter department she formed a large and valuable collection of shells, which she presented, a few years ago, to the Natural History Museum at Huddersfield. She was highly gifted as a linguist, and acquired an excellent knowledge of French, Italian, Spanish, and German, and was thus enabled to be of the greatest assistance to her sister in correspondence and the translation of foreign works of science. She is most widely known, however, by her remarkable talents as an artist, which were employed in the illustration of her sister's works, and in the production of a splendid series of diagrams in which are depicted a large number of the most important injurious insects in all their life-stages.

In addition to her scientific and artistic work, she devoted much of her time and means to benevolent objects, and carried out for many years, at her own expense, a system of distributing books of an entertaining and instructive character amongst the working classes.

Women of such a type are rare, and we cannot but deeply deplore the loss of this eminent Christian lady, who died at an advanced age, full of good works, performed in a most unobtrusive manner; richly endowed with intellectual and artistic talents, which she largely used for the benefit of others; always happy and cheerful in her daily domestic life; kind, hospitable, and sympathetic; ready to help all who deserved her aid and to give wise counsels to those who sought them from her.

To her sister—her life-long colleague—the loss is beyond what words can express. We can only venture to offer to her our heartfelt sympathy and our earnest wish that she may have grace and strength to endure so heavy a blow.

C. J. S. B.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting was held in London, on the 21st and 22nd of October, when the following were elected officers for the ensuing year:—

President—J. W. Dearness, London.

Vice-President—H. H. Lyman, Montreal.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors: Division No. 1—James Fletcher, LL. D., Ottawa.

Division No. 2—Rev. C. J. S. Bethune, D.C.L., Port Hope.

Division No. 3—Arthur Gibson, Toronto.

Division No. 4—A. H. Kilman, Ridgeway.

Division No. 5—C. G. Anderson, London.

Ontario Agricultural College—Prof. J. H. Panton, Guelph.

Librarian and Curator—J. A. Moffat, London.

Auditors—J. H. Bowman and R. W. Rennie, London.

Editor of the Canadian Entomologist—Rev. C. J. S. Bethune, Port Hope.

Editing Committee—Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal; Rev. T. W. Fyles, South Quebec; James White, Snelgrove.

Delegate to the Royal Society—J. D. Evans, Trenton.

Committee on Field Days—Dr. Wolverton; Messrs. Hotson, Balkwill, Saunders, Anderson, Rennie, Bowman, Elliott, and Spencer, London.

BOOK NOTICES.

A LIST OF THE BUTTERFLIES OF SUMATRA, with especial reference to the species occurring in the north-east of the Island. By L. de Nicéville and Hofrath Dr. L. Martin. Calcutta. Reprinted from the Journal of the Asiatic Society of Bengal, 1895.

This list of seven hundred and fifty-six species of butterflies taken in a limited portion only of the great Island of Sumatra, gives one some idea of the wealth of the insect fauna in tropical regions. In a very interesting introduction the authors give a brief description of the Island, which is nearly as large as France and is bisected by the equator, and relate the difficulties that have to be surmounted in the formation of a collection of its butterflies, which can only be effected by employing natives, who have first to be taught and trained for the purpose. Dr. Martin lived for thirteen years on the Island and has thus been enabled to add very interesting notes on the distribution, scarcity or rarity, habits, season of occurrence, etc., of a large number of species. One may, therefore, open the list anywhere and find not a mere record of names, but highly interesting details regarding the butterflies. As might naturally be expected, the preparatory stages of the majority of the species are as yet unknown.

A LIST OF THE BUTTERFLIES OF SIKHIM, by Lionel de Nicéville, F. E. S., etc. Calcutta: from the Gazetteer of Sikhim. Printed at the Bengal Secretariat Press.

Probably no part of the great British Empire of India and its tributary States has been so fully explored by the collectors of butterflies as the country of Sikhim, which includes the famous health resort of Darjeeling, about 7,000 feet above the sea, on the slopes of the Eastern Himalayas. Consequently the author is able to record in this list no less than six hundred and thirty-one species, which he considers a near approach to the maximum number that can be discovered. Certainly it is a goodly number, and one hard to be realized by a dweller in these northern and much less luxuriant regions. And what splendid creatures they are, with their gorgeous colouring and infinite variety of shapes and hues. Nearly fifty species of Papilios alone are recorded, and more than one hundred and fifty Lycinidæ, the greater number of which belong to genera that are entirely unknown to us here.

CRITICAL REVIEW OF THE SESIIDÆ FOUND IN AMERICA NORTH OF MEXICO, by William Beutenmüller, pp. 111-148, Bull. Am. Mus. Nat. Hist., VIII., 1896.

The writer of the present brief notice of this excellent paper on the *Sesiidæ* desires to call attention to the very careful work of Beutenmüller on the clear-wings and the necessity for this work which has arisen from the uncritical publications of preceding authors. It appears, for instance, that our *S. lustrans*, a species well distinguished by antennal peculiarities, has been five times the subject of new descriptions by the late Mr. Hy. Edwards, whose species are very properly reduced, as appears from Beutenmüller's studies. The name hitherto used for this species itself must, it seems, give way to *bassiformis*, Walk., described from a type in poor condition. Beutenmüller is quite correct in calling attention to the particular necessity in this group for good material from which to describe. The want, perhaps, of such material led Mr. Edwards to describe *S. rutilans* six times over. A large number of sexual determinations by Mr. Edwards are corrected by Mr. Beutenmüller, so it seems hardly possible for anyone to have worked with less judgment. The list of the clear-wings in the New York Check List was drawn up, with the rest of the list, by the writer of the present lines, who at the time merely sent the last proof to the late Mr. Hy. Edwards for his revision. Mr. Edwards added, in explanation, the two foot-notes on page 12 and signed these, and made one or two changes in his names for genera on page 11. The writer is also responsible for the list of the clear-wings, since he originally wrote the same, and not Mr. Edwards. The explanation is here given, as the list has been erroneously alluded to as the work of Mr. Edwards. In the Philadelphia list the New York list is generally copied, but *lustrans* is wrongly given to Mr. Hy. Edwards, and an implication is conveyed in the preface that Mr. Hy. Edwards was the author of the list of the clear-wings, which is here corrected. The writer trusts that Mr. Beutenmüller will continue his studies and that lepidopterists generally will help him in every possible manner. It is a matter of great satisfaction that Mr. Beutenmüller's timely work is also of such good quality. The writer would merely reclaim his *Sesia pictipes*, which is also given to Mr. Hy. Edwards, on p. 134, and draw attention to the excellent description of the habits of this species given by the late Dr. Bailey in the pages of the *American Entomologist*.

CORRESPONDENCE.

"DIE SATURNIDEN."

SIR,—In comment upon my friend Dr. Dyar's kind notice of my classification of the *Saturniides*, I would say that I believe the stinging spines of *Hemileuca* and *Automeris* may have developed along different lines from an initiatory existence in a common ancestor. I place, therefore, the origin of these groups lower down, approximating, in my "tree," *Hemileuca* seems to me to have differentiated from the lower and primitive type (which latter is *Agliid* and has retained more of the *Tineides* characters) by the achieving of the Saturniid character of the forking of IV, and IV₂. This character is of the first importance and indicates the original divergence of the primitive group. In my "tree," I show by the relative heights the relative specialization of the subfamilies. With regard to *Aglia*, it does not seem to me to be necessary that the larva should have reacquired, but merely retained, the anal tubercles which have become lost in *Citheronia*. The latter is a degenerate type. In my "tree," I have carried *Citheronia* beyond the base of the *Aglia* stem, to show its independent devolution; but only a little way beyond, because, in a vertical view, *Citheronia* represents the lowest Saturnian form, retaining vein VIII., which both *Aglia* and *Automeris* have lost. I place *Automeris* higher than *Hemileuca*, which Dr. Dyar has not noticed. *Automeris* and *Aglia* are more specialized in other directions, but have retained the primitive location of IV₂. All these points have been considered in my "tree."

A. RADCLIFFE GROTE, A. M.

RARE BUTTERFLIES.

Euptoieta Claudia.—Toronto, 1893 (am not sure of month, but think I took it in July).

Libythea Bachmani.—Caesarea, 12th August, 1896.

Satyrus Alope.—Niagara Falls, Canadian side, 14th July, 1896.

Colias Caesonia.—Toronto, 13th, 20th, and 27th June, 1896. Fairly common.

Papilio Ajax.—Toronto, 27th June, 1896. Saw several specimens, but only took the one. Saw first one on 14th June.

Pieris Oleracea.—Æstiva—Caesarea, 12th August, 1896.

ARTHUR GIBSON, Toronto.

Mailed November 3rd.