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The Canadian Entomologist.

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ON CERTAIN SPECIES OF SATYRUS.

BY W. H. EDWARDS, COALBURGH, W. VA.

1. NEPHELE.—Kirby, Faun. Bor. Amer., 1837, described this species as follows: "Wings brown; primaries both above and below with a paler submarginal broad band including two eyelets; the upper ones surrounded by a paler atmosphere, with a black iris and white pupil; on the under side the atmosphere of the eyelets is most distinct and forms a kind of glory round them," etc. Nothing is said of the sex, but apparently this is the description of a female. The wings of the male are blackish-brown, usually of uniform shade throughout—that is, in the typical male, corresponding to the female of Kirby. But there is a frequent departure from this type in the direction of *Alope*, the "pale atmosphere" about the ocelli appearing in the male, and in both sexes gradually widening and becoming less obscure till it culminates in a clear yellow band. When this is reached we have *Alope*, Fabr. So that *Nephele* intergrades completely with *Alope*. But this is not everywhere and always. The metropolis of the typical *Nephele* is in Canada and northern New England, that of *Alope* in the States south of New York. There is a line running about with the southern boundary of New York, or it may be, in Pennsylvania, below which *Alope* holds sole possession, and no tendency is discoverable towards *Nephele*. In the extreme northern area, if there is any departure from typical *Nephele*, it is the exception, not the rule.

Mr. Scudder, in his essay on The Distribution of Insects in New Hampshire, 1874, says of *Alope*: "This insect is tolerably abundant, sometimes very common, in the southern half of New England. The most northern localities . . . . are Norway, Me., Thornton and Shelburne, N. H., and Sudbury, Vt." Thornton is just south of the White Mountains, and Shelburne is close by the mountains on the northeast. Of *Nephele* he says: "It is foun dover the whole northern half of N. E. in great abundance. The only locality in which I have met with it is in Massachusetts, in the elevated region about Williamstown," &c.

This place is in the north-west corner of the State, next the Vermont line, and the elevated region spoken of is a continuation of the Green Mountains. So it appears that *Nephele* comes down to the Massachusetts line and *Alope* flies as far as the White Mountains. In the intervening district the intergrades fly just as in New York.

I made application to Canadian lepidopterists for information about the occurrence of *Alope*, and soon ascertained by examples sent me that *Nephele* with a pale atmosphere, but not at all indicative of a band, passed by the name of *Alope*. Thereupon I sent a typical *Alope* to Mr. William Murray, of Hamilton, who kindly offered to make inquiry of his acquaintances in different sections of Ontario. He replies, 31st Dec., 1879: "I now send you my information. Of all my correspondents not one has ever seen an *Alope* that has been taken in Canada, but *Nephele* has been taken by all. I begin to think that *Alope* is not to be found in Canada at any point."

Mr. H. H. Lyman writes from Montreal: "In July, 1876, I spent a couple of days at a farm near Freligsburg, P. Q., one mile north of the Vermont border, and found *Nephele* very common. Most of the specimens taken showed a yellow ring about the eye-spots on primaries, but one of them shows on upper side a somewhat faint, but quite discernible, patch corresponding to the yellow band of *Alope*. Was at same place in 1877. *Alope* was not seen either year." Mr. Caulfield writes Mr. Lyman: "I have never taken a specimen of *Nephele* showing any tendency towards *Alope*, nor have I seen any Canadian examples showing it." Mr. Lyman adds that at Portland, Maine, where he collected several summers, *Alope* was common as well as *Nephele* and all intergrades.

(To the west of New York, in the latitude of the belt spoken of, it is believed that the two forms fly together at least as far as Wisconsin. Prof. A. J. Cook writes that both are common in Michigan, south of the latitude of Grand Rapids At Toledo, Mr. John Wilson writes that *Nephele* is rare, and *Alope* unknown, so far as appears. At Cleveland, O., Dr. J. F. Isom informs me that *Alope* is very rare, but that *Nephele* is abundant in some seasons. In south-west Ohio, Dr. H. K. Landis, of Columbus, writes that he cannot learn that either form has ever been taken. They are not mentioned in Mr. Dury's list of butterflies found about Cincinnati. But in northern Illinois *Nephele* is abundant and *Alope* not found at all. So that somewhere between New York and Illinois, in Ohio and Indiana, *Alope* seems to disappear, while *Nephele* be-

comes the sole form; but whether the separation is abrupt or gradual is not ascertained. As the information which I have been able to gather is so meagre as regards the States west of New York, I shall confine my remarks to that State and New England.*)

We have therefore in these separated districts two apparently good species, answering to any definition of that name. But between, there is a belt of latitude passing through New York and southern New England, where in one section or other both types are found and the whole series of intergrades. In this belt *Alope* and *Nephele* are found to be dimorphic forms of one and the same species. I formerly was of the opinion that they were distinct species, though in some districts there were intergrades. I thought these approaches of one to the other did not bridge the whole space between. In a paper printed in Proc. Ent. Soc. Phil., 1866, I gave my reasons therefor. But some observations made in July, 1876, at Martha's Vineyard, led me to suspect a closer relationship between the two species or forms. In the open country back of Oak Bluffs, I found these butterflies fresh from chrysalis, and in considerable numbers. They were all very black, diminutive, and there was every gradè from what I had been in the habit of calling *Nephele* to unquestionable *Alope*, with a broad clear-colored band. The band was not yellow, however, as in the typical *Alope*, but reddish-yellow like that of *Pegala*, which Fabricius called *rufa* in distinction from *flava*, applied to *Alope*. Mr. Scudder took the same small reddish-banded form on Nantucket, which island is about 30 miles from the mainland, Martha's Vineyard being about 7. I call this variety *Maritima*, but whether it is restricted to the islands, or appears on the adjacent coast, I am not yet advised. Mr. Mead obtained for me a large number of eggs of this butterfly, while at the Bluffs shortly after my departure. They were laid by the broad-banded females in confinement and mailed to Coalburgh. There the larvæ hatched out, and these as well as the eggs were found to be precisely like the same stages of *Nephele* from Catskills. But none of the larvæ survived the winter.

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* I shall be greatly obliged to any readers of this who will give me information as to the occurrence of *Nephele* or *Alope* west of New York. Two plates of Part IX Butterflies of North America will be devoted to the illustration of these forms and varieties, and intergrades, and I desire to make the history of the species as complete as possible in the text.

In the belt spoken of, *Nephele* rather keeps to the highlands. It is the prevailing form in the Catskills, if with it are classed the intergrades, but full-banded *Alope* may be taken in small numbers every season. Along the Hudson River, *Alope* is the common form, but I have received intergrades very near to *Nephele* from Mr. Hulst, taken at Hoboken, N. J.; and a black *Nephele* ♂ from Mr. H. Laitloff, which he writes me was taken some five years since near Greenville, Jersey City. It was so unusual a form that Mr. Laitloff sent it to me for name. At Coalburgh, W. Va., *Nephele* is never seen, but *Alope* is the only form; and so on southward.

2.—*Alope* was described by Fabricius, Ent. Syst., 1793, as fuscous *(fusca)* with a yellow *(flava)* band; with two ocelli on fore wings; on hind wing one ocellus above, six below. The band is very broad in the female, usually narrower in the male, pale yellow in both sexes. The ocelli resemble those of *Nephele* and vary in same manner. Usually they are round, but sometimes oval; are either small or large, often equal, but sometimes the upper is larger, at others the lower. Now and then a third pupilled ocellus appears, and individuals have been taken with but one ocellus (the upper). It is not very unusual to find examples in which a black point, or what may be considered as a rudimentary ocellus, presents itself. On the upper side of hind wing is often a small but complete ocellus near inner angle, but in many cases it is partly or wholly wanting; and occasionally there are one or two black spots in addition. The males in the majority of examples have six small ocelli on the under side of the hind wings; the females rarely have six, and often none at all. At the north, *Alope* is blackish-brown, more brown in the female; but to the southward brown prevails in both sexes; and it is of a lighter shade, while the under side has a tint of yellow more or less decided over whole surface, often mixed with gray. The band is of yellow, or with a slight ochrey tint. This is a description of the extreme southern type, and to distinguish I call it var. *Texana*. All examples from Texas which I have seen have a complete anal ocellus, and six ocelli beneath, of pretty large size—larger than in northern *Alope*—in distinct ochrey rings; the pupils white points with a few blue scales about them in the larger ocelli. Of 70 *Nephele* ♂ examined, 50 have 6 ocelli, 11 have 5, 3 have 4, 3 have 3, 2 have 1, 1 has 0.

Of 55 *Nephele* ♀, 6 have 6, 1 has 5, 4 have 4, 13 have 3, 7 have 2, 13 have 1, 11 have 0.

Of 24 *Alope* ♂, 15 have 6 ocelli, 3 have 5, 4 have 1, 2 have 0.

Of 25 *Alope* ♀, 12 have 6, 1 has 4, 4 have 2, 4 have 1, 4 have 0.

Therefore of *Nephele* ♂, 71 per cent. have 6 ocelli, 4 per cent. have under 3; 1.4 per cent. have 0.

Of *Nephele* ♀, 11 per cent. have 6, 56 per cent. have under 3, 20 per cent. have 0.

Of *Alope* ♂, 62 per cent. have 6 ocelli, 25 per cent. under 3, 8 per cent. 0.

Of *Alope* ♀, 24 per cent. have 6, 48 per cent. have under 3, 16 per cent. have 0.

3.—The dark Satyrus which inhabits Illinois and westward has gone by the name of *Nephele*, though differing somewhat from *Nephele* of the east. I was struck by the difference between a series sent me by the late Mr. Walsh from Galena, years ago and when I first began collecting butterflies, and a series of *Nephele* taken in the Catskills, and I have always kept the two apart in my cases, considering the Illinois form as at least a well marked variety. Mr. Worthington has recently written me: "I have received a lot of *Nephele* from New Hampshire and am surprised at the difference between them and the Illinois *Nephele*."

The males of this last are almost black, the ocelli are very small and without rings. But in some examples there is a faint russet or yellowish tint about the ocelli, and perhaps on the space between them. On the under side the rings are russet or ochraceous, on both wings. The females are almost invariably and uniformly dark, and only occasionally is there a paler shade over the extra discal area of fore wings. Out of a number of females I find but one in which there is a clouded yellow space about the ocelli, and only three on which there are yellow, though hazy, ocellar rings. Of 16 ♂, 14 have 6 small ocelli beneath, 1 has 5, 1 has 2. Of 19 ♀, 2 have 6, 2 have 5, 6 have 4, 2 have 3, 6 have 2, 1 has 1. This form prevails exclusively to the Rocky Mountains. I have received it from Nebraska, Montana, Colorado and New Mexico, but *Alope* is unknown to me from that region.

In CAN. ENT., ix., 141, 1877, I gave the history of *Nephele*, bred from eggs laid by a typical female from the Catskill Mountains, Hunter, N. Y. In fall of 1878, I wrote to several correspondents for eggs, and by their good will obtained many. Prof. Lintner and Dr. Bailey sent eggs of *Alope* from Albany, N. Y. Rev. Mr. Hulst, with the zeal and kindness which distinguishes him, crossed the rivers from Brooklyn to Hoboken, and

brought away females of *Alope*, from which he obtained eggs for me. 'I got *Alope* eggs here at Coalburgh from three females. A friend at Hunter sent eggs of *Nephele*, and Mr. Worthington sent many of the Illinois form from Chicago. In each case the parent was sent with the eggs that the type might be noted. From Albany, Hoboken is 150 miles south; Coalburgh 800 miles southwest; Hunter is 35 miles southwest of Albany and of about 2,000 feet greater elevation. Chicago is about 800 miles northwest of Coalburgh and 1,000 west of Albany. So that the five localities are separated by considerable distances, and there has probably been no intercommunication at any time so far as these insects are concerned.

The eggs of the six lots were kept apart and as the larvæ hatched (at from 14 to 28 days from deposition, depending on the temperature), they were placed on sods in separate pots and left in the coolest room in my house. But some of the Illinois eggs were sent to Mr. C. P. Whitney, at Milford, N. H., who offered to put them on ice. I wished to try the effect of cold in retarding the hatching. Early in February I received the boxes again and found a number of healthy larvæ, with a few unbroken eggs. These last proved to be dead. The eggs had been sent in a paper pill box which was within a flat tin box, and this was set directly on the ice. The young larvæ when I received them were fixed to the rough sides of their box and had not been attacked by mould, the enemy most to be dreaded. Mr. Whitney wrote that he was notified in December that the ice-house was empty, and he thereupon removed the tin box without opening it, and placed it in a snow bank, where it remained till I sent for it. The larvæ may have been emerging from the eggs when he first received them, or perhaps did so in the interval between ice-house and snow. This method of keeping larvæ which become lethargic immediately upon leaving the egg will probably be found successful with all species of butterflies which have that habit—as the large Argynnids—and make it possible to breed them in numbers. I have been unable to find any other mode of wintering such larvæ without a certain loss of most of them.

On 23rd Jan., 1879, I transferred such of the Satyrid larvæ as were living (and this included some of each lot) to fresh sods, and 28th Jan. noticed that several were feeding. One Hunter *Nephele* passed 1st moult 23rd Feb'y, and before 4th March several of the same lot had passed the moult. But the Illinois *Nephele* and all *Alope* lingered. One Coalburgh *Alope* and one from Hoboken passed 1st moult 7th March, by which date

the Hunter *Nephele* spoken of was swollen for 2nd moult, which it passed two days later. Two Illinois *Nephele* passed 1st moult 8th March. To the end some of the Hunter *Nephele* were in advance of all, and some of the Illinois examples lingered behind all. The stages of Coalburgh *Alope* were as follows :

1st moult passed	7th March.	
2nd " "	21st "	1st to 2nd—14 days.
3rd " "	14th April.	2nd to 3rd—24 "
4th " "	2nd May.	3rd to 4th—18 "
In chrysalis	26th "	4th to chrys. 24 "
Imago issued	9th June.	chr. to imago 14 "

Of Hunter *Nephele* I find no notes, but in 1877 the stages were

1st moult to 2nd—23 days.
2nd " to 3rd—14 "
3rd " to 4th—14 "
4th " to chry.—28 "
Chrys. to imago—14 "

Of Illinois *Nephele* the stages were :

1st moult passed	8th March.	
2nd " "	21st "	1st to 2nd—13 days.
3rd " "	9th April.	2nd to 3rd—19 "
4th " "	26th "	3rd to 4th—17 "
In chrysalis	17th May.	4th to chry.—21 "
Imago issued	30th "	chry. to im.—13 "

The eggs of all these forms are alike, not to be distinguished from each other. They are conoidal, truncated at top and slightly arched ; marked by about 18 vertical ridges running from base to top, the spaces between excavated roundly, and crossed by fine striæ ; the top is covered with shallow cells, the outer ones irregularly hexagonal, the inner long and narrow about a central oval cell.

Nor can the larvæ of these forms be distinguished from each other up to second moult. The young, of first stage, are very peculiar and quite unlike what they become after first moult, as well as unlike all other Satyrid larvæ which I have bred. Under the microscope they look like the vertebræ of a fish, by reason of the many rows of long hooked bristles, those of upper and lower rows being curved back, the middle row for-

ward. General color carnation, with a medio-dorsal line, and three lines on each side, all of crimson. After 1st moult the color is green, and the stripes, which are the same in number and position as the lines of first stage, are dark green; the hairs short and straight.

After 2nd moult the color becomes yellow-green and the stripes are changed. There is now a dark green one on middle of dorsum and a yellow one covering the ridge over the feet. On 24th March, I compared Hoboken *Alope*, Hunter and Illinois *Nephele*, of same age, all lately past second moult, and could see no difference whatever between them. Some *Alope* and Hunter *Nephele* were much covered with long hairs which were bent to the surface and gave them quite a shaggy appearance. But others did not show this peculiarity.

On 18th April, I compared Coalburgh *Alope* and *Nephele* from both localities, all past 3rd moult; length from .68 to .75 inch. All were yellow-green and in general alike; all had the yellow basal ridge, but in addition to this, the Illinois *Nephele* had a distinct longitudinal yellow stripe on upper part of side, and on either edge of the green dorsal stripe was a fine yellow line. The Hunter *Nephele* showed very faint traces of the yellow side stripe; the *Alope* none at all.

Comparing another Coalburgh *Alope* and Hunter *Nephele* a few days later, both past 3rd moult, neither showed traces of these lines and I could see no difference between the two.

At 4th moult all the Illinois *Nephele*, now .7 inch long, showed same peculiarities as at last stage. No other larva of the several lots presented the yellow lines so plainly at the same age, that is, just after the moult; but there were one or more *Alope* and Hunter *Nephele* which gave indications of the side line, and this came out more distinctly as the stage progressed. But most were without the side line.

Comparing mature larvæ:

One Albany *Alope*, length 1.25 inch, greatest breadth .16 inch; color very yellow-green, no yellow side or dorsal stripes or lines.

One Coalburgh *Alope*, length 1.6, gr. br. .2 inch; color yellow-green, the side more green than dorsum; a yellow side line, quite indistinct.

Hunter *Nephele*, 3 examples; length of one 1.2 inch, gr. br. .15 inch; of another 1.15, br. .16 inch. Two were yellow-green, of same shade as nearly all the Coalburgh larvae. One was more decidedly

yellow, with less green; but in none was there a yellow side stripe or the fine dorsal lines.

Illinois *Nephele*, length 1.36, gr. br. .14 inch. Color bright yellow-green, the dorsum more yellow than side; on the side as broad a yellow stripe as the one along basal ridge, and the green dorsal stripe edged by yellow.

Summary as to larvæ:

The five lots could not be separated before 2nd moult. After that, through the stages to maturity, the *Alope* from different localities and the Hunter *Nephele* varied somewhat in the shade of green, being more or less yellow; in some yellow prevailing on dorsum, green on sides; all had the yellow band on basal ridge, either pale or deep colored. If the yellow side line was present, as in some examples it was, it was indistinct, or obsolescent. They varied also in the hairy surface, some having the hairs short and upright, others long and bent down. The Hunter *Nephele* could not be distinguished from *Alope* by any permanent character.

The Illinois larvae were deep yellow-green after second moult, and the side stripe was always present and distinct. The hairs were never long and bent. The larvae were distinguishable from all the others.

Comparing chrysalids:

One Albany *Alope*, A. length .56 inch, greatest breadth .21 inch; color deep green, covered with smooth specks and patches of a lighter color, but which scarcely affect the general green hue; top of head case, ridge of mesonotum and ventral edges of wing cases cream color. This was the only one I obtained, and it produced a male butterfly.

One Hoboken *Alope*, same size and color, and produced a male.

One Hunter *Nephele*, length .6, br. .2 inch; was precisely like the Albany *Alope* in appearance, and produced a male.

Another Hoboken *Alope;* color yellow-green, and on the dorsum were three longitudinal yellow bands, one on middle of abdomen, ending at base of mesonotum, the others sub-dorsal, extending from last segment to head. This died before imago.

One Coalburgh *Alope;* length .8, br. .24 inch; bright yellow-green, covered with the lighter specks and patches, but not so as to obscure the ground; the wing cases clouded with darker green in long stripes; the three yellow dorsal bands as in the *Alope* last mentioned; edges of head, wing cases and mesonotum cream color. This produced a female butterfly, with broad yellow band and like the parent.

Another Coalburgh *Alope*, length .6, br. .22 inch; like the foregoing, being both banded and clouded. Produced a female butterfly, with broad yellow band.

One Hunter *Nephele*, B; color yellow-green, bands and clouding of wings present but indistinct. Produced a female.

Three Hunter *Nephele;* all yellow-green, with no bands or clouding; the edgings cream color. These all gave males. The chrysalis described CAN. ENT., ix., 143, produced a female, but showed no band or clouds; the edgings cream color.

Two Illinois examples; length .6, br. .22 inch; color a pale blue-green, the powdery covering giving a whitish hue to the whole; no bands or clouds; the edges of mesonotum, head and wing cases white. Both these gave males. I obtained no females from this lot.

Summary as to chrysalids:

The largest *Alope* and Hunter *Nephele* were alike in color and in dorsal stripes, clouds on wings, and edgings of head case, etc.; but the bands and clouds were most distinct in *Alope*. All these large chrysalids produced female butterflies. The plainer and smaller chrysalids were male. But one female *Nephele* chrysalis is recorded as without clouds or bands.

The Illinois chrysalids were of same shape as the rest, but were small and plain colored, and were blue or whitish-green; the edgings white instead of cream color. They were readily to be distinguished from any other.

Results in butterflies:

The chrysalis A, Albany *Alope*, gave a male not differing from many males taken at Hunter, and which there I always regarded as true *Nephele*, though off type, being without band, but with a narrow yellow nimbus about the ocelli and connecting them, the edges everywhere fading into the black ground.

On the other hand, the chrysalis B, Hunter *Nephele*, gave a typical female *Alope*, with a broad and clear yellow band. The female which emerged in 1877 from the Hunter *Nephele* before spoken of had both ocelli surrounded and connected by yellow, and stood midway between the types of the two forms.

The two chrysalids from Illinois, as I have said, gave males; one wholly dark, the irides without rings; the other had a faint russet nimbus about them, and over the intervening space was a tint of russet.

The Coalburgh chrysalids produced typical *Alope*, with broad yellow

bands, and like the females which laid the eggs. Therefore outside the belt of dimorphism *Alope* produced *Alope*, but inside the belt *Alope* produced *Nephele* and *Nephele* produced *Alope*.

In conclusion:

In Canada the typical *Nephele* is the only form representing the genus Satyrus, except that possibly in some localities *Alope* or intergrades may appear; but if so, it is only occasionally. In New York and part of New England a belt of latitude is passed where in one section or other both these forms fly, besides an endless variety of intergrades. Finally, *Alope* emerges in the south from this belt as the only form, and inhabits a broad zone, which ends about with the southern line of North Carolina and of Tennessee, but at the southwest flies in parts of Texas, and has become slightly modified when compared with the *Alope* of the middle States. And to the west, somewhere between New York and Illinois, *Alope* disappears, and a slightly changed form of *Nephele* presents itself, and occupies the country to and on the eastern slopes of the Rocky Mountains. In some cases this cannot be distinguished from the typical *Nephele*, but as a whole, it has taken a departure, and has come to have differences in its larva and chrysalis. I call this form variety *Olympus* (after the companion of the satyr Marsyas when the latter had his little difficulty with Apollo).

The relationship between *Alope* and *Nephele* is in good degree paralleled by L. *Arthemis* and *Proserpina*, the first of which occupies the northern half of the Continent, but is dimorphic with the other in a belt of latitude which passes through the northern States from Maine to Wisconsin. *Proserpina* emerges from this belt on the south, and grades imperceptibly into *Ursula*, which last changes gradually till it has acquired a type, in Arizona, as different from that in which it manifests itself in Pennsylvania as the Texan *Alope* is from *Alope* of New York. This belt is nearly coterminous on both north and south with the belt of dimorphism in the Satyrids. It is worthy of note also that the dimorphism of P. *Turnus* begins inside this belt.

In this last-named species it has been supposed that the melanic form (confined to the female, *Glaucus*) first originated by accident, and was afterwards perpetuated and obtained an advantage over the yellow form, and finally in good degree supplanted it throughout its southern area, and that the existence of enemies had much to do with the suppression of one form, while their absence favored the other. What influence has

gradually transmuted *Alope* into *Nephele* it is difficult to conjecture. It could not here be the presence or absence of enemies which has affected one or other form. And if it is climatic, what can there be in common between the climate of Canada and Illinois which encourages *Nephele* and extinguishes *Alope?*

In a second paper I shall speak of *Pegala* and the Pacific species of this genus.

ENTOMOLOGY FOR BEGINNERS.

BY JAMES FLETCHER, OTTAWA, ONT.

Entomology seems to be gradually throwing off the veil of contempt under which it has been so long hidden. The Botanist has always to a certain extent been deemed a philosopher from the important part plants play in Pharmacy; the Geologist and Mineralogist, too, from the possibility of their discovering precious metals have been treated by the outside unscientific world as sages worthy of some respect. Entomologists, however, have not thus been honored by the masses. The question would be asked—What tangible results can come from collecting flies and bugs and sticking pins through them? and in vain the amount of damage done by insects year by year might be estimated and pointed out. This state of affairs though I believe is now at an end. The claims of the science on all agriculturists and horticulturists are daily becoming more apparent. The institution of the United States Entomological Commission, and the success that has attended that organization from the happy choice of such men as Messrs. C. V. Riley and A. S. Packard as directors, has perhaps done more than anything else to open people's eyes to the fact that after all there is something in Entomology. In Canada, too, much good work has been done. In 1868 two Entomological magazines were started, our own important organ, the CANADIAN ENTOMOLOGIST, in August, for Ontario; and *Le Naturaliste Canadien*, edited by the Abbé Provancher, in December, for Quebec; to these is chiefly due the progress the science has made in Canada. The Editors of the CANADIAN ENTOMOLOGIST—Rev. C. J. S. Bethune (1868–1873), and since that time our present

esteemed Editor—have always by their many charming and descriptive papers evinced a desire to make the study of Entomology as fascinating and easy as possible for beginners, while at the same time they have paid full respect to their scientific readers. *Le Naturaliste Canadien* is published in the French language. It was commenced in December, 1868, from which time the Abbé Provancher has fought bravely, and almost single-handed, against all obstacles, striving by its means to create among the French Canadians a love for the natural sciences, particularly Entomology. I am very sorry to see by the December number that on account of the grant which the Editor received from the Government having been discontinued, his valuable work may possibly be stopped; this would be a great pity, and every Entomologist ought to give a hand in helping him out of his difficulty. The magazine has been of great value to the farmers of Lower Canada, who in its pages have always received courteous answers on any subjects in the many branches of natural history affecting agriculture.

In the eleven volumes of the ENTOMOLOGIST now published, or in the Annual Reports of the Society, descriptions of nearly all the common Canadian insects, and illustrations of many of them, will be found. I would particularly call attention to a paper in the Annual Report of 1872 by Rev. C. J. S. Bethune, entitled "Beneficial Insects." This gives an outline sketch in a concise manner of the different divisions into which insects are divided and the distinguishing points of each.

With the above mentioned volumes and Dr. Packard's Guide to the Study of Insects, a very complete knowledge of the rudiments of Entomology can be obtained; the rest can only be learned by observation and experience in the field. Undoubtedly the first and most important step of all is to commence a collection. Study can only be carried on satisfactorily from the actual specimens, which should be examined alive whenever possible and full notes taken of any striking peculiarities observed; when preparing specimens for the cabinet, the one idea which has to be borne in mind, and upon which the whole value and beauty of the collection depends, is that they may appear natural, and a knowledge of how to effect this can only be attained by observing living specimens.

At the last annual meeting of the Society the importance of popularizing Entomology was discussed, and the Editor of the ENTOMOLOGIST kindly consented to give up some space every month entirely to popular Entomology, for the benefit of beginners and others who are unable to

study the science systematically; this step it was considered might materially increase the usefulness of our Society. It is proposed to have short papers on individual species, which will be illustrated whenever possible, and there will also be papers on the best modes of making and preserving collections. The work will be considerably facilitated if beginners will state any difficulties which they may encounter, for it is only by their mentioning their difficulties that the Editor can know how to assist them. Any questions which are of such a nature that they will be likely to assist others in their studies will be answered through the pages of the ENTOMOLOGIST when space admits.

THE CALOSOMAS OR CATERPILLAR-HUNTERS.

These insects belong to the Family called CARABIDÆ, which is a large and difficult Family to study, or even to define and limit exactly. The insects belonging to it are remarkable for their graceful forms, and at the same time for their cruel and predaceous habits, both in the larval and perfect states. It is this last trait which makes them such useful auxiliaries to the horticulturist.

Fig. 4.

The better known of the two represented here is called *Calosoma calidum*, Fabr., (fig. 4) or "The Glowing Beautiful-bodied Caterpillar-hunter." As an exception to the general rule, its English name is more formidable than the Latin; but so important a personage is its bearer that I will not deprive him of a single letter of his title, and indeed am almost tempted to add to it the words "most useful." It well merits its appellation, *Calosoma* (*Kalos* = beautiful, and *Soma* = a body). Fig. 4 gives a life-size representation of it. The color of the polished elytra or wing-covers is a deep blue-black, and the six rows of dots with which they are adorned are of a fiery burnished red, for which reason it has been called by the specific name of *calidum*. The legs in our figure are too thick and clumsy, but it must be well known to everyone. It may generally be found in early summer in damp pastures, either hidden under stones or running in the grass in search of caterpillars and other soft-bodied insects. Jaeger, who first called the members of this genus caterpillar-hunters, says "they may be found every morning and evening upon the branches of trees, looking out for caterpillars and

devouring them." They do not, however, restrict themselves to caterpillars, for they will attack and devour a perfect June-bug when fresh from the pupa state and soft, with apparently the same relish as their special dainty, a fat Cut-worm. In the larval state they are equally rapacious; they lurk in holes in the ground or under sticks and stones in the daytime, and only leave their retreats as night draws on to go in search of prey. Every spring I have several of these useful and luckily common beetles brought to me by kind friends who have found them in their gardens. To the enquiry, "Is this of any use to you?" I have always the answer ready, which somewhat surprises them: "No, but it is of particular use to you; take it carefully back and put it in your garden again; it is the best friend you have there, for it feeds entirely upon your enemies, the Wire-worms, Cut-worms and White-worms."

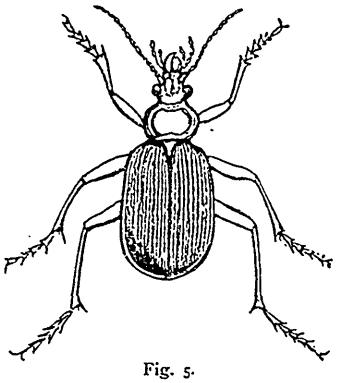

Fig. 5.

I am sure that through the agency of this beetle alone I have been able to gain more respect for the science of Entomology among horticulturists than from all the rest put together.

Much resembling this beetle in shape, but of a very much more striking appearance, is its near relative, *Calosoma scrutator*, Fabr., the "Beautiful-bodied Searcher," fig. 5. The color of its wing-covers is bright metallic green, garnished with longitudinal lines and sparsely punctured; round the margin runs an effective line of coppery-red. The head, thorax and legs are almost black; the margin of the thorax having a greenish tinge. The under side is of a deep burnished blue-green hue. Its habits are the same as those of *C. calidum*, but it is a much rarer insect. I have never seen a live specimen; but they are occasionally found in Ontario, and dead specimens are said to be frequently washed up on the outer shore of Toronto Island after a southerly gale.

ANNUAL REPORT OF THE ENTOMOLOGICAL SOCIETY FOR THE YEAR 1879.—The Annual Report of our Society for the past year is now nearly ready for issue. Members may expect to receive their copies within a few days.

THREE NEW SPECIES OF BOTIS.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

BOTIS OPPILALIS, n. sp.

♂ ♀. Allied to the *feudalis, s-linealis* group. Pale ochrey, opaque, powdered with deeper ochre and fuscous scales. Discal dots small, indistinct, orbicular a solid point, reniform an open ring. Lines acutely dentate. Outer line exserted opposite the cell, forming an inward tooth at vein 2, and again another at vein 1, on primaries. On hind wings the outer line runs evenly outward till over the median nervules, where it approaches the margin, then running inwardly and straight across to internal margin. This species wants the usual subcostal indentation of the outer line on secondaries. A terminal ochre line. Thorax deep ochrey. Beneath whitish; primaries shaded with ochrey superiorly; markings of upper surface faintly repeated. Fringes concolorous or a little paler than wings. *Expanse* 28 mil. Two specimens, Mass.; one male sent me by Prof. Peabody from Amherst, Mass.; Maine, Dr. Packard.

BOTIS OSCITALIS, n. s.

♂ ♀. Allied to the preceding, but both the discal marks are open. Opaque, ochrey, but more dusty, or fuscous tinted. Lines in lunulated thick scallops, not fine and dentate. Outer line forming three more exserted scallops over median nervules, strongly drawn in below median vein, with an outward projection below vein 2, else the lower part of the line is tolerably even. Hind wings paler than primaries with the outer line drawn in sub-costally and forming three exserted lunules over the median nervules, thence running inwardly and more evenly and faintly to internal margin. Fringes a little paler than the wing; terminal line obsolete. Head and thorax like fore wings. Beneath paler, with the pale fuscous markings repeated, slightly iridescent; body parts whitish. Labial palpi dark above, whitish beneath. *Expanse* 27 mil. Two specimens, Ohio, Mr. Dury; Maine, Dr. Packard.

BOTIS DISSECTALIS, n. s.

Allied to *marculenta*. Of the same bright yellow, shading to ochreous at base of primaries on costa and sides of the thorax in front. Ornamentation sub-obsolete. This species wants the subterminal line of

marculenta. Instead there is a vague and broad darker shade only visible with attention. The outer line is rounded outwardly over the median nervules, as in *trimaculatis*. It is apparently disconnected below vein 3, appearing again higher up below the open reniform and describing an inward curve above vein 1. The orbicular dot is imperceptible and the inner line very faint. Fringes faintly discolorous, being pale fuscous, concolorous with the lines. Hind wings very pale fuscous with a slight yellow cast. The line is continuous, squarely projected over median nervules, very different from allied forms. A pale terminal line before the pale fuscous fringes. Beneath largely washed with fuscous, legs outwardly white. On primaries the marking of the upper surface reappears relieved by pale interspaceal blotches; hind wings pale fuscous, uniform, with the line repeated. Palpi white beneath, dark at the sides. *Habitat*, Hamilton, Ontario, Mr. Moffat. The species seems a little stouter bodied than *marculenta*, of about the same expanse.

CORRESPONDENCE.

SWARMING OF ARCHIPPUS.

DEAR SIR,—

The assembling of *D. archippus* referred to in CAN. ENT. is perhaps not so frequently noticed as their passing over localities in flocks. Several years ago I saw them congregating in a bit of woods in the neighborhood of the city which I was visiting at the time. At least every other day ey were hanging in a listless kind of manner to the underside of branches in immense numbers, with their wings closed, and not noticeable unless disturbed, very few being on the wing. Their favorite resting place seemed to be dead pine twigs, which would be drooping with their weight, and in more than one instance I saw one too many light and the twig snap, and send a dozen or more into the air to seek for another perch. In going to and from the woods I have seen several of them at once coming from different directions, high in the air, sailing along in their own easy and graceful way, all converging to the one spot. I did not see them depart. I went one day and could not find one in the woods; and as there were thousands, perhaps hundreds of thousands of them, it would have been a fine sight to see them go. The following year they were remarkably scarce and it was three years before they were even moderately plenty.

J. ALSTON MOFFAT, Hamilton, Ont.

SWARMING OF ARCHIPPUS.

DEAR SIR,—

I was surprised to learn from the letter of Mr. Edwards in your last issue, that the flocking of *archippus* is not a well known fact in Entomology, and in view of this I venture to add a few facts in regard to it which may be of interest.

While spending the winter of 1875-76 in Apalachicola, Florida, I found one of these *archippus* swarms in a pine grove not far from the town. The trees were literally festooned with butterflies within an area of about an acre, and they were clustered so thickly that the trees seemed to be covered with dead leaves; fig. 6 will enable the reader to form some idea of their appearance thus grouped. Upon shaking some of the trees a cloud of butterflies flew off, and the flapping of their wings was distinctly audible. They hung in rows (often double) on the lower dead branches, and in bunches on the needles. I find by my note book that visiting the flock towards evening, it was receiving additions every moment. I caught a net full off a bunch of dead needles, and, walking away to some distance and letting them go, all but three returned to the flock. The question as to where they came from seems a very interesting one. I was told by Dr. A. W. Chapman that there was hardly Milkweed enough in all Florida to produce one of these flocks, which doubtless do not confine themselves to Apalachicola. During my visit I found two more flocks not far from the first, but neither of these was as large. I should mention that I often observed examples among them *in coitu*.

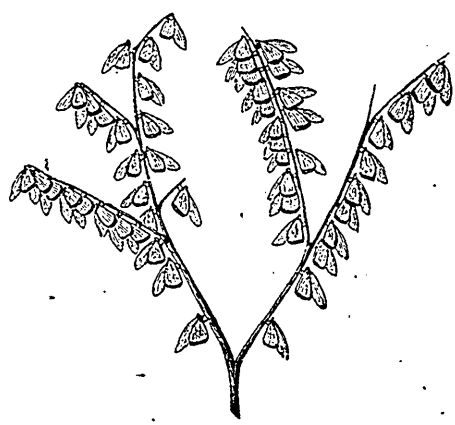

Fig. 6.

I have seen *archippus* flocking at the Isles of Shoals, N. H., towards evening, in very much the same manner, having flown nine miles from the mainland. I have also seen clusters of *Vanessa J-album* on tree trunks

at dusk in New Hampshire, which seemed to present a parallel to the *archippus* flocks, though of course on a very small scale.

R. THAXTER, Newtonville, Mass.

DEAR SIR,—

Last summer I discovered, unfortunately too late, that a large *Cossus* was working in some large and very old Oak trees near here. I hope next June or July to find out what it is, as I shall construct nets to envelop the tree trunks of several of these so infected Oaks. None of my correspondents have been able to give me light on the subject; they think it possible that this is a new species, and urge close observation, advice which I hope to be able to follow.

I also purchased five large trees of a coarse variety of Poplar, known here as Cottonwood, that were to be cut down, as they had commenced dying, "caused by a *grub* working in them." I found it to be a *Cossus* larva, but not as large as that working in the Oaks. Judging from a comparison of the empty pupæ cases found in them, which in these Poplars were very numerous, it is not the one described by Mr. Bailey in last January number as "*Cossus centerensis*," but seems more like *Xystus robiniae*. I had three of the trees cut down in order to obtain the pupæ; judge of my surprise and disappointment when my man came in, telling me he could find *none* but "lots of nasty *grubs*, of which he had given the near chickens probably a hundred or more," not thinking them valuable to me. I sent him back with instructions to preserve every larva he could find, and I now have about fifty in every stage of development from the half-inch beet red, the nearly two-inch long pink, to the about two and a half-inch long greenish-white larva. I have some in the wood in their own burrows, and have put the rest in sawdust; and I have ordered him to cut me pieces of that wood, bore some holes in the ends and put in the other larvæ, and cork it in, leaving a few air-holes; with these I hope to complete my observations in a warm room. I did not know before that these hybernated in the larval state, much less did I think they would be found of different moults.

A. H. MUNDT, Fairbury, Ills.

MIGRATION OF BUTTERFLIES.

DEAR SIR,—

I have received the following notes on migration of certain butterflies from Prof. J. E. Willet, of Macon, Ga., dated 19th Jan'y, 1880.

W. H. EDWARDS, Coalburgh, W. Va.

"I saw Callidryas *Eubule* passing here in great numbers during Sept., Oct. and Nov., 1878, from N. W. to S. E. About noon, when they were most abundant, there would be half a dozen visible all the time, crossing a 15-acre square of the city. They pursued an undeviating course, flying over and not around houses and other obstructions. They flew near the ground, and stopped occasionally to sip at conspicuous flowers. A geranium with scarlet flowers, and set in the open yard, attracted most that flew near it. Papers in Southern Georgia noticed the great numbers passing at different points; and a friend in Southern Alabama sent me specimens of the same, saying that they were subjects of speculation there. About March, 1879, there was a similar migration from S. E. to N. W., but in diminished numbers. I saw the fall migrations again Oct. and Nov., 1879, but in smaller numbers than in 1878. A lady of So. Georgia told me that her husband called her attention to the fall migration 26 years ago, and that she had observed it every year since. C. *Eubule* is found here in small numbers at other seasons of the year."

EARLY STAGES OF EPHEMERIDÆ.

The Rev. A. E. Eaton would like to communicate with anybody who would supply him with examples in fluid of nymphs of some of the American genera of Ephemeridæ. He would readily offer to pay a fair price for them and would defray their carriage to England. All that would be required would be five or six nearly full grown examples of one species per genus, put up in narrow tubes or narrow cylindrical bottles (one tube for each set), containing a solution of two parts of water to three of spirits about 60 over proof, well corked and with the cork tied down. Some tissue paper should be put into each tube with the specimens, to prevent the solid contents moving about within the tube when its position is shifted, care being taken not to compress the insects; and the tube should be filled up as nearly as possible with the fluid, to the exclusion of air bubbles. The tubes should be packed up with cotton, wool or tow, in a box, so that they shall be kept upright during the voyage; and this box should be packed into a stronger case with tow or hay or straw, and forwarded to Mr. Eaton by express, or through the agency of some bookseller, *not through the Post Office.* Address Rev. A. E. Eaton, 51 Park Road, Bromley, Kent, England.