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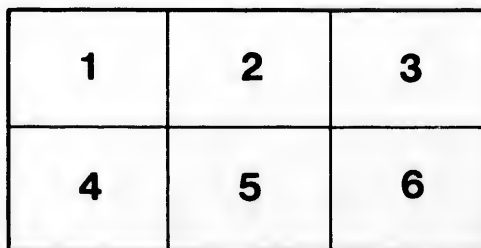
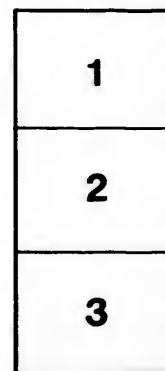
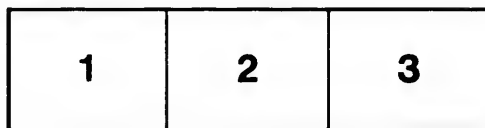
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H. B. Dyrell
with kind regards.

A TRIP TO NEPIGON.



SOME NOTES UPON COLLECTING AND BREEDING BUTTERFLIES FROM THE EGG.

BY JAMES FLETCHER, OTTAWA.

It is a recognized fact in Economic Entomology that the most important investigations are those by which the life-histories of insects are made out, in order that the most appropriate remedies may be adopted for injurious species. In Scientific Entomology these investigations are no less important, but are undertaken with different objects in view. For the accurate determination and separation of closely related species, it is frequently necessary to know an insect in all its stages from the egg to the perfect form. In no branch of Natural History is this more necessary than with some of our Diurnal Lepidoptera—the butterflies—those living flowers which flitting from blossom to blossom add such an unspeakable charm to the summer landscape. In the North American insect fauna we have some very large genera, as the Fritillaries (*Argynnidæ*) and the Clouded Yellows (*Coliadæ*). These contain many closely allied species, and it would actually be difficult in all cases to identify with certainty the perfect insects, without a knowledge of the preparatory stages, and some have only been shown to be distinct by breeding from the egg, and noting carefully the points upon which they constantly differ in their various stages of growth. Whilst, in the first case, the exact scientific identification of the insect, its classification, name and specific value are of little interest, so that so much of its habits can be discovered as will enable us to put a stop to, or prevent a recurrence of its ravages; in the other case, the exact identification and correct classification are the important points aimed at. Sometimes, as in the well-known cases of *Papilio Ajax*, *Colias Eurytheme* and *Grapta Interrogationis*, several apparently very different varieties have been shown to be merely varietal forms of one species, and the interesting discovery has been made that one or other of these forms preponderates at certain seasons of the year. These discoveries are chiefly due to the constant and untiring labours of Mr. W. H. Edwards, of West Virginia, who not only himself patiently and persistently perseveres in his studies, but has also taken great pains to induce others to help in the work. His kindness and prompt attention in advising and helping others cannot be too highly spoken of. In the *Canadian Entomologist*, for 1885, appeared some admirable articles upon breeding from the egg, in which the results of his long experience were given. These have been of great assistance to those who have taken up this most interesting branch of entomology, and the writer acknowledges with gratitude his own indebtedness. Those who have never caught a butterfly and caged it to obtain its eggs, and then bred these to maturity, cannot form the slightest idea of the all-absorbing interest and pleasure that attend these observations. Moreover, their utility, as teaching what to observe, how to observe it, and then how to record what is seen, so that it may be of use to others, cannot be over-estimated. At first, of course, there are some difficulties, but with a little practice these can be overcome. This fact is particularly manifest in drawing or describing the young caterpillars at the different moults. All caterpillars change their skins four or five times after they leave the egg, so as to allow for the rapid increase in size of their growing bodies. At all these moults, important changes in the structure and in the markings of the skin take place, and for this reason they

should be carefully described and the head case should always be preserved at each moult. The skin cannot as a rule be preserved, for the young caterpillar after having worked it off generally devours it at once. There is a prevalent idea that great difficulty attends the obtaining eggs and rearing the larvæ; but this is not at all the case; a few eggs of many species may be obtained from ripe females by merely shutting them in a pill box. In this way I have secured eggs of *Pieris Napi*, *P. Rapæ*, *Thecla Niphan*, *T. Calanus*, *Lycaena Lucia*, etc., etc. These eggs hatch after a few days and then all that is necessary is to put them in any small receptacle which will prevent their food from drying up, as a tin box or glass jar, or what is better they may be placed upon a living plant out of doors. Many eggs may be obtained and much valuable information may be gathered by hunting for the eggs upon the food plant, or by watching the females in nature. The action of butterflies when intent upon egg-laying, will soon be recognized, and patient observation will frequently reward the student by the discovery of an unknown food plant. A knowledge of the habits and food of allied species even in other parts of the world will frequently assist greatly.

The field, too, is so large and the amount of work yet to be done, so great that the merest tyro may hope to obtain good results in a very short time. I purpose in the present paper to give an account of a collecting trip I had the privilege of making with Mr. S. H. Scudder, of Cambridge, during the past summer. I believe that the experience then gained and a description of the apparatus used will be of assistance to others who have not yet taken up this fascinating study.

Our trip together was made in the beginning of July, and was from Ottawa to Nepigon and back. Nepigon is a small station on the Canadian Pacific Railway, very picturesquely situated at the mouth of the rapid river Nepigon, which brings down the icy waters from the lake of the same name, about fifty miles due north; and discharges them into Nepigon Bay, the most northern point of that great triangular inland sea, Lake Superior. It is claimed for this river, that it is the only river which discharges clear water into the lake, and that its trout are larger and fishing better than those of any other river in Canada. Be this as it may, it has gained such celebrity that during the summer there is a constant stream of visitors who come for a week or fortnight to try their luck with Nepigon trout, and the verdict of all seems to be "we must come again."

The village consists of the railway station, which is also used as a church, an hotel and two stores, as well as several surveyed lots for the site of the future town. About half a mile from the railway, by the side of the river is the neat Hudson Bay post of Red Rock, now presided over by the genial and courteous Mr. Flanigan, who always remembers anyone he has once met, takes an interest in their pursuits and is ready with advice and assistance whenever required. Nepigon is very prettily situated; as you approach it by the railway from the east, the first glimpse you get is from the iron bridge which spans the river half a mile from the station. Then a charming picture bursts on the view. Away to the left lies a long range of hills, behind which are the lake and Nepigon Bay with its islands and indented shores. They are some miles away and the river gradually widening, winds its way down to them amongst green fields and wooded banks. A glimpse is got of the pretty Hudson Bay post with its neat white building and the rest of the landscape is filled in by the high banks of the river, thickly clothed at the top with trees. After passing beneath the bridge the river swings away to the right, and has cut out from the clay an extensive bay, leaving a steep cliff of clay over 100 feet in height. Looking out on the other side, up the river you see Lake Helen, a beautiful sheet of water, stretching away to the north for eight miles, with a width of one mile, and bounded on its eastern side by a rocky ridge of laurentian gneiss and with elevated wooded banks to the west or left. "The Ridge," as we called it, to the right is the higher of the two, and was found to be bare rock in many places with little vegetation. Arriving at Nepigon station we took our traps to the Taylor House, an excellent hotel, most clean and comfortable, and having made arrangements for meals, we sallied forth at once with our nets to "look at the locality."

It may not be amiss to stop here for a few moments and explain what brought us to Nepigon in preference to any other place.

That there was some strong attraction it will be readily granted. I had gone there from Ottawa (808 miles) two years running, before this season, and had now persuaded Mr. Scudder to come all the way from Boston to accompany me.

I have elsewhere mentioned that in 1885 Professor Macoun brought back with him from this locality a collection of butterflies. In this collection were some of exceptional interest and one of which was a great surprise. This was a new species of the Arctic genus *Chionobas* (or *Eneis*, Hüb.). It was a surprise not so much from being a species of that genus but from being of a distinctly western type. It resembles most nearly *Ch. Californica* of the Pacific coast and is a large species, expanding from 2 to 2½ inches. Besides this there were several specimens of *Colias Intercessor*, Saund, *Argynnis Electa*, Edw., as well as many other insects, and amongst them a small *Chrysothamnus*, of which Mr. Edwards says "it may be *Florus*." I am of the opinion that it certainly is not *Holloides*, Bill, but it seems to me to approach more nearly to *Dorcas*, Kirby, and *Epixanthe*, B. L. The female is the same size as *Dorcas* and the spots are almost identically the same. In the Nepigon species, however, the color of the upper surface is deep purplish brown, and upon both primaries and secondaries, between the margin and the post-median band of black spots, is a band of orange lunules running out to the broad margin from each spot on the primaries. These are larger and longer outside the three lowest spots, corresponding with the greater distance of these three spots from the margin than the three uppermost. On the secondaries the orange spots are much smaller and the continuous band although discernible is indistinct towards its upper end. The coloration of the under side is very rich, being bright rusty orange, slightly washed with purple over the secondaries and at the apices of primaries. The spots and marks, as on the upper side, are like those of *Dorcas*, of which indeed this form is possibly a variety. I have mentioned it here at some length because it has not been taken again at Nepigon since Professor Macoun took the five specimens he brought back with him. Specimens identical with these were sent to me by Dr. W. Brodie, of Toronto, who took them at Tobermory in the same district in September.

Now, the eggs of the species I have mentioned and those of *Carterocephalus Mantian* were our particular desiderata and these were the attractions which led us to Nepigon in preference to nearer places.

The whole fauna and flora of the locality are, however, of particular interest from their northern character. The geographical position of Nepigon is about lat. 49°, lon. 88°, and apart from its northern position it has a cooling influence exercised on it by the proximity of the large mass of cold water found in Lake Superior. The difference in the state of development of the plants here and at Ottawa was at once noticeable when we left the hotel and began to search for the treasures we had come for. In the clearing round the station and "village" wild strawberries and raspberries were still in flower, and the white stars of *Cornus Canadensis* were a conspicuous feature. In the woods the Lake Superior Nodding Trillium, *T. declinatum*, was still in flower, together with *Clintonia borealis*. A variety of *Rosa blanda* was just beginning to expand, and the bushes of *Amelanchier Canadensis* were a beautiful sight. *Streptopus roseus* and *Actaea alba* were everywhere abundant beneath the trees, and amongst the mossy stumps *Captis trifolia* and *Mitella nuda* opened their gemlike flowers. By the river banks magnificent clumps of *Caltha palustris*, the marsh marigold, caught the eye. All these are spring flowers which at Ottawa expand their blossoms in the middle or end of May, and although there were some flowers of a later date amongst them, the character of the flora was such as we had seen at Ottawa at least a month sooner. We learnt upon inquiry that upon the 1st of June the woods had a great deal of snow in them and the ice had only lately left the river.

The collecting grounds at Nepigon may be described as follows:—Starting from the hotel near the railway and going down to the Hudson Bay post is a tract of low woodland and beyond this are the fields and meadows belonging to the Hudson Bay post. Opposite the hotel and north of the railway is a road running back into the woods, and parallel with Lake Helen. This is called "the wood road," and is used in the winter time to bring down firewood from the highlands beyond the clearing. Turning westward along the track, high rocks and banks soon come down to the railway on the right

hand side; but to the left are low woods with open grassy glades which at once tempt the entomologist—nor will he be disappointed for this is the now celebrated "Macoun's glade," the home of *Chionobas Macounii* and many other little beauties. The other locality lies in the opposite direction, and turning eastward after leaving the hotel you pass down through a hot gravelly cutting and cross the iron bridge over the river. On your right hand you have high woods and on the left an extensive swamp thickly covered with small spruce and tamarac. About a mile from the bridge the Ridge is reached and this runs away to the north until it reaches the shores of the lake.

Upon July 5th we reached Nepigon at 12:20 p. m. and by 1 o'clock had unpacked the necessary apparatus, had disposed of dinner and were ready to start. Our apparatus for each collector, consisted of a net, two cyanide bottles, one for lepidoptera, the other for grasshoppers, etc., a bottle of spirit for beetles, and a flat tin box 4 inches by 3 and 1 inch deep filled with envelopes for butterflies, as well as a supply of pill boxes for boxing living females and a yard or two of netting for making cages. Before leaving the hotel we picked up half a dozen empty tomato cans and having removed the two ends we covered one of them with a piece of netting kept in place by an elastic band. We were now ready and turning westward before many yards were passed we were arrested by a clump of *Anaphalis Margaritacea* which was receiving the busy attention of a female *Pyrameis Huntera*; she was secured and boxed at once. Passing on along the line we found the banks on either side resplendent with clumps of *Mertensia paniculata*, a beautiful plant with rich deep-green leaves and a profusion of pure blue bell-shaped flowers which hang pendant from small branchlets. Flowers of a real blue are very uncommon in nature and to see such profusion as we here found was very charming. Darting around these flowers with lightning swiftness were a few pugnacious skippers. We caught one specimen which was at once recognized as strange. It belongs to the "Comma group" of Pamphila and somewhat resembles *Mantoba*. What is probably the same species was afterwards taken on "the ridge" and eggs were secured. After passing a deep gully a few hundred yards along the track we turned in by a bridle path towards Macoun's glade. Insects of all descriptions were in the greatest profusion and this is undoubtedly a character of this locality. In no place, except perhaps Vancouver Island, have I seen such enormous numbers of specimens as we found here. The air seemed to be filled with them. Hymenoptera, Lepidoptera, Orthoptera, Diptera—Ah! the very word carries me back in thought. Yes. There were Diptera and the character of the locality was carried out—they were in profusion. Nepigon as well as being famed for its trout is famed for its "flies," mosquitoes, black-flies, sand flies, tabanus, chrysops. Oh! The thought of them!! An appropriate variety for every hour of the day and they all carried out their mission in life with a vengeance. They could however be kept within reasonable bounds with a little care and forethought. "Mosquito oil" composed of sweet oil, oil of penny-royal and carbolic acid applied to the face and neck and backs of the hands was found to be efficient out-of-doors. Some people however are too obstinate to use this harmless ungent averring that "flies don't trouble them much," and they don't like putting such mess on themselves. These people however sometimes have to suffer severely and it will be found that the prevention is well worth the trouble. In our bedrooms at night we enjoyed perfect immunity from attack by burning a small quantity of Pyrethrum powder before we went to bed. The recollection of that phalanx of bloodthirsty flies which met us at the entrance to Macoun's glade has led me to digress somewhat; but at any rate they were a feature of the place and a most noticeable one. As we stepped into the pathway which leads into the glade, I was carefully pointing out to my companion that we were now in the exact spot where the original type specimens were collected, when he rushed by me with a yell and sprang out into the bushes, exclaiming, Look out! There is one—here it is! and the first specimen of *Chionobas Macounii* was secured—a minute later I had another. Hurrah! well done. We were now in a high state of glee. I had been to Nepigon once before at exactly the right season and again a month later, but had not seen a specimen, and had begun to think that perhaps after all there might possibly be some mistake about the locality. It was all right now, though, and as we were to stay a week we felt confident of getting eggs. We took four more males on the 5th of July. We examined

thoroughly this beautiful glade and collected several specimens, but the most important part of the afternoon's work was settling upon a spot for our cages. For ease in examining them, these were all placed near to each other.

In the glade was a great profusion of flowers and grasses, a few spruces, cedars and pines mixed with poplars, aspens (*Populus tremloides*) and birches, all of which were dotted about in a waving sea of grasses. The most conspicuous and abundant of which were, in the low parts *Avena striata* and *Poa debilis*, together with a profusion of low Carices, *C. bromoides* being very plentiful. Upon a sandy bank towards the railway *Danthonia spicata* grew in tufts with *Carex Houghtonii* and other lower species of carex. Amongst them *Convolvulus spithameus* opened its glorious white corollas. To the western end of the glade was a dry swampy tract, or rather a dry track where were growing many plants which in the east only grow in wet bogs and swamps. The Labrador tea (*Ledum latifolium*), *Cassandra calyculata*, *Viburnum cassinoides*, Kalmias, Eriophorums, Sphagnums and *Drosera rotundifolia* were all here in luxuriant profusion. Willows of various species were everywhere. Through the centre of this glade runs a path which had been used during the construction of the railway, and along this as everywhere through the country where hay has been carried for horses, red and white clover and timothy grass grow abundantly. Beyond this swampy corner the ground rises again and is covered with trees and bushes. Upon this elevated knoll was the only place where we took *Lycena Comytas* and *L. Couperi* neither of which were abundant. Before leaving the glade for the night, we caged Pyrameis Huntera over a plant of *Anaphalis margaritacea*, this is too large a species for confining in a tomato can cage, so another kind had to be constructed. This is made by cutting two flexible twigs from a willow or any other shrub and bending them into the shape of two arches which are put one over the other at right angles with the ends pushed into the ground; over the pent-house thus formed a piece of gauze is placed, and the cage is complete. The edges of the gauze may be kept down either with pegs or earth placed upon them. This kind of cage was used for all the larger species which lay upon low plants. Besides the specimens of *Ch. Macounii* we had taken many other species of butterflies, moths, beetles and flies. Among the moths several specimens of *Nemophila Selwynii* another new species discovered by Prof. Macoun in this locality. When we got home in the evening we found that a party of American fishermen had arrived and in the hour before tea had already stocked the larder with Nepigon trout, the reputed excellent qualities of which we afterwards tested and unanimously concurred in. The evening was pleasantly spent enjoying Mrs. Flanigan's genial hospitality, and after we got home labelling, dating and packing away our specimens. This is a most important duty and must be done every day. Nothing is so easy to forget as the exact date or locality of a specimen, and when this is lost much of the value of the specimen is gone. We never allowed fatigue or any other cause to induce us to put off this part of our work till the morrow.

The delicious cool nights were a great treat to us after the exceedingly hot weather we had both experienced during June, and we appreciated all the more the cool breezes, the exhilarating air and the refreshing bathing in the icy Nepigon, when our daily letters kept telling us of the great heat which was prevailing at this time throughout the greater part of Ontario and the Northern States.

The next morning we were up early, note books were written up and preparations made for the day. We found that few insects were moving before 8.30, so we seldom started until that hour. Our daily routine was as follows:—Write up notes before breakfast, visit the cages after breakfast, then work down to the river about noon, and take a swim, call at Mr. Flanigan's to receive and post letters, dinner at one; collect in the afternoon. After tea walk a mile down the track to a delicious spring and bring back a tin pailful of water for drinking. After this one pipe, then label, discuss and put away the captures of the day, and go to bed. On the 6th we started off at once to Macoun's glade with the set purpose of getting females of *Macounii*, and, as is generally the case when one starts with a set purpose, we were at last successful. As we stepped out into the glade there sailed away from our feet a bright brown butterfly, with black stripes. So much of the size, appearance and graceful flight of *Limenitis Disippus* as almost to have escaped our notice. Something about it, however, seemed

different, and a few steps and the well-known twist of the wrist, captured our first specimen of female *Macounii*. Oh, but she was a beauty! Colour bright brown, with the nervures all darkened, and bearing on the primaries two large and white-pupilled black ocelli with one small one between them. The females we found to vary very much. Most of them were handsomer and darker than the males, with larger ocelli and the nervures almost always clearly marked out with black—some, however, and particularly one female taken by Professor Macoun in 1885, at Morley, in the Rocky Mountains, is of the beautiful pale golden brown of *Ch. Californica*. Morley is the only other known locality for this fine species. Its most interesting feature is the total absence in the males of the sexual streak of special scales, or *Androconia*, which marks the males of this genus. During the day we secured altogether nine females, and tied them in three cages over clumps of grass, (*Avena striata*). When we left we carried away with us upwards of 250 eggs, which were afterwards distributed to everyone we knew of who would take the trouble to rear the larvæ. Conspicuous objects at this time were the Yellow Swallow-tails, (*P. Turnus*), and one was seen to lay an egg upon a small aspen. This was a new food plant to us both, so capturing half a dozen females they were tied in a gauze bag over a branch of a living aspen tree. This was another kind of cage, and is very useful for such insects as *Papilio*, *Limenitis* and *Grapta*. Care must be taken, however, that the leaves of the branch inside may be in a natural position, for some species are very particular about where they place their eggs. For instance, *Nisoniades Icelus* and *Papilio Turnus* lay on top of the leaves, *Limenitis* on the edge near the tip, and many others as *Danais Archippus*, *Pyrameis Huntera*, *Colias Eurytheme*, underneath. Some, as the *Lycenas*, lay upon the small flower stems. A few, as *Argynnis Myrina*, *A. Bellona* and some of the *Pamphilidæ* will lay indiscriminately all over the food plant, the ground and the cage. With *Papilio Turnus* it was necessary to tie our bag so that the branch hung naturally inside it. When a bag made beforehand is used the points must be rounded, and in tying a piece of gauze over a branch care must be taken to pull out all creases and folds, or the insects will be sure to get into them and either die, or as we found in some instances, be killed by spiders from the outside of the bag. It is better to put more than one female in the same cage. I have frequently noticed that one specimen alone is apt to crawl about or settle on the top of the cage, and not go near the food plant. When there are two or three they disturb each other and are frequently moving and falling upon the food plant, when they will sometimes stop for a second and lay an egg. A stubborn female of *Colias Eurytheme* was only induced to lay by having a male placed in the cage with her, by his impatient fluttering and efforts to get out she was frequently knocked down from the top and every time she fell upon the clover plant beneath she laid an egg before crawling to the top again.

By the evening of the 7th we had the following species caged:—*Papilio Turnus*, *Colias Eurytheme*, *Pyrameis Huntera*, *Chionobas Macounii*, *Pamphila Mystic*, *Amblyscirtes Vialis*, *Nisoniades Icelus*.

The *Colias* was tied upon a plant of clover (*Trifolium pratense*) I had taken with me. It will be found a wise precaution to take with you a few plants in pots when travelling by rail to collect eggs. I have practiced this for years and have always been glad that I have done so. Half a dozen 3-inch pots will fit easily into a fruit basket with a handle, and are very little trouble. In these you can take two pots of grass (*Poa pratensis* preferred) for *Satyridæ* and *Pamphilidæ*, a plant of red clover and one of white clover for *Coliads*. Nearly, if not all these species will lay upon these plants, although it would appear from this year's experience they will not all eat them. One pot with a smooth-leaved violet (*V. blanda*) and one with a rough-leaved species (*V. cucullata*). These are for the *Argynnidæ*. If grass is abundant and in convenient tufts for caging insects upon, one of the pots of grass may be emptied and the pot used for any local plant which is thought to be the food of a local species. On Sunday, 8th, the only note of interest was the appearance of sand flies in such numbers as to almost drive out the little congregation which gathered at the station-house for service.

On Monday morning, the 9th, we got up early and made an early start. After visiting the Zoological Garden, as we now called our vivarium, we fought our way through a

thick swampy meadow overgrown with willows, down to the river's edge, in hopes of finding *Chrysophanus Florus*. We were, however, unsuccessful in this effort. Up to this time we had not seen a single *Colias Interior*, although a hundred miles east on our journey up we had seen them in abundance along the line of railway. On this account we decided to return the way we came, instead of going, as we had arranged, down the lake by steamer. Even if the species appeared before we left it could only be the males now, as they precede the females by about a week. We had seen them abundant at Sudbury, so decided to stop over there on the way back. There also lived Mr. J. D. Evans, an enthusiastic collector, and one who was specially interested in *C. Interior*.

In the afternoon we made an expedition up the wood road. Here we secured two female *Carterocephalus Mandan* and numerous examples of *Phyciodes Nycteis*, *P. Tharos* and *Lycæna Lucia*. *C. Mandan* was one of our special desiderata. We had taken several males, but these two females and another were the only ones we caught. They were at once, in deference to Mr. Scudder's wish, caged over *Poa pratensis*. This species was of particular interest to me, and after having bred the larva from the egg past the fourth moult to hibernation, I still find it one of the most interesting butterflies I know. It is rare but widely distributed. I caught my first specimen on Vancouver Island in 1885. The same year Professor Macoun took it in the Rocky Mountains, and Mr. J. M. Macoun took it at Lake Mississini, and I have seen it in woods near Bobcaygeon, Ont. From the positive statement in European works that the larva of the very similar *C. Paniscus* feeds upon *Plantago*, I had tied specimens taken at Nepigon last year upon that plant, but got no eggs. I should have made the same mistake this year but for Mr. Scudder's knowledge. It illustrated well the value of experience.

Before we caged our two specimens he maintained that he did not believe *Plantago* was the food plant of our species, but said that if the egg proved to be ribbed, he would alter his opinion; if, however, it should be smooth and hemispherical, like those of the Pamphilidæ, he was positive that grass was its food plant. As this was an important question, we decided that if another specimen were taken we would dissect it, and discover the nature of the eggs. Later in the afternoon this opportunity occurred, and the eggs were then discovered to be smooth, as he had anticipated. The correctness of his views as to the food, were also afterwards corroborated by the females laying on the grass and the young larvæ eating it readily, and refusing plantain leaves. The same day we caged *Amblyscirtes Vialis*, *Pamphila Cernes* and *Lycæna Lucia*. The first two on grass, the last on a flower-bearing twig of *Cornus stolonifera*, the Red-osier Dogwood. As we passed through the heavy herbaceous undergrowth, a sharp eye was kept on the stems of the *Epilobium angustifolium* for the larvæ of the rare *Alypia McCullochii*. In 1887 I discovered this to be the food-plant without recognizing the larvæ. Unfortunately no notes were taken of their appearance; all I can remember is that they were smooth and black, with yellow markings—more like the larvæ of *Eudryas*, I should say, than of *Alypia octomaculata*. I collected two larvæ and placed them in a jar with some of their food. The next morning they had buried, and not thinking they were of any special interest I did not unearth them. This spring I discovered, with chagrin, what they were, and that I had no description of the larva. The pupa was very similar to that of *Eudryas grata*, both in shape and colour.

This day marked an era in the records of our trip. I find it underlined in my diary. "To-day Chrysopters first appeared in numbers." There seemed to be a plague of them. Directly we entered the woods we were set upon, and at last were compelled to put nets over our heads and wear handkerchiefs over the backs of our necks. Amongst the new captures of the day were one specimen each of *Lycæna Couperi* and *Argynnis Aphrodite*, the latter fresh from the chrysalis.

On Tuesday morning, 10th, *Argynnis Bellona* and *A. Myrina* were both tied over plants of *Viola renifolia*, and eggs were laid within a few hours. Upon clover flowers in a small meadow near the Hudson Bay Post, and, curiously, nowhere else, a few specimens of *Colias Philodice* were taken. In the woods the *Eurythème* and *Keewaydin* forms of *Colias Eurythème* were caught and tied on clover. After dinner we had decided that we would take a trip to "the Ridge." Soon after passing the railway bridge over the Nepigon, our first specimen of *Colias Interior* was bagged. What a lovely species it

is. The colour, when once seen, is recognized again, even on the wing, at once. The clear brimstone yellow, and the conspicuous triple fringe, pink with a carmine streak in the centre, and the perfectly immaculate underside, make it a great favourite with all who have seen it in its native wilds. From this point, westward to Port Arthur, on Lake Superior, and eastward as far as Lake Nipissing, this beautiful species is abundant. During the afternoon we took nine specimens, all newly emerged males. To get to the ridge we struck off from the railway in a north-easterly direction, across a sphagnun bog. We found no insects of interest in the bog, although there was a profusion of flowering plants; the wild roses being very beautiful. We at last reached the ridge, and found the sides very precipitous. After a time, however, we came to the dry bed of a stream, and climbing up through the tangled growth of spiked maple, cedar, viburnum and cornel, we gained the top after a hard climb; here we found the vegetation much parched; flakes of moss slipped from the bare rocks as we trod upon them, and the leaves of trees and bushes were faded and drooping. In every shaded crevice grew mosses and bog plants—glorious *Cyripediums* (*C. acule* and *C. parviflorum*), which it was impossible to pass by. Upon the bare, exposed rocks, in some places, grew patches of *Potentilla tridentata*, now in blossom, and the only flower growing out in the open sunshine. Here we took some more specimens of the little skipper, like *P. Manitoba*. They were very difficult to take, and when once disturbed, dashed off over the edge of the cliff. One specimen of *Ch. Macounii* was taken on the top of the ridge, after a most exciting chase. It rose from a wet bog some distance from the brink of the cliff, and we were sure that we had a specimen of *C. Jutta*, which species Professor Macoun had taken here at this time of the year. Nothing else of any particular interest, with the exception of some sub-arctic plants, was found on the ridge. *Lathyrus ochroleucus*, the Pale-flowered Everlasting pea was noticed in the rocky woods as we descended, and was noted as a possible food-plant of *Colias Interior*.

12th July. This was our last day, and we had a good deal to do before we left. Our cages had all to be examined, the eggs collected and packed, and the start for home to be made. In collecting butterflies for the cabinet, if good specimens are desired, it is necessary to kill them in a cyanide bottle. This is easily made, either by putting a small quantity of cyanide of potassium in a wide-mouthed bottle, or by cutting out a hole in the cork and putting a piece of the poison in the cavity. A convenient bottle I use myself, is made in this manner: the cyanide is kept in place by a piece of chamois leather, which entirely covers the cork, and is tied over the top like the mouth of a sack. I leave about an inch of the leather above the tie, and this is very convenient for holding the bottle, or extracting the cork with your teeth when both hands are occupied. But as cyanide of potassium is a deadly poison, great care must be taken not to get any of it upon the leather. By this upper portion, too, the cork is easily tied to the neck of the bottle, a precaution which will frequently save much annoyance and trouble, especially when mosquitoes are troublesome. A further precaution, which has many times been of service to me, is to tie a short piece of bright scarlet cloth to the neck of the bottle. It is a much easier matter than some would imagine to drop, lose, or even forget your cyanide bottle when stopping frequently to put away specimens, or make notes. Many times have I found a lost bottle by this means. When specimens are thoroughly dead, they should be taken from the poison bottle and dropped into envelopes. If left in the bottle they soon become rubbed and spoilt. Some specimens when dying, instead of closing their wings, open them right out until the two undersides meet. These may be left as they are, because the underside of every species must be shown in a collection. If, however, it is desired to close the wings, they should be taken out of the cyanide bottle, which makes them rigid, and left for a few hours, when the muscles will relax; or, on the other hand, they may be left in the poison bottle for 24 hours, or longer, and the same thing will take place. This last plan, however, is not a good one. The envelopes for lepidoptera are made by taking small squares of paper and folding them across, almost in the middle, so as to make a triangular form with one flap a little smaller than the other. When the insect is placed between the two flaps, the two edges of the larger one are folded over the lesser, and your insect is now ready to be labelled and packed away. Small cigar boxes are very convenient for carrying lepidoptera, or for sending them by mail.

When we came to pack up our live stock, we found that we had secured eggs of 17 species and varieties, all that we had tied but three. These three were *Grapta Progne*. A very much worn hibernated specimen was caught on the 9th, and being mistaken for *G. Satyrus*, was tied upon the wrong food-plant

Phyciodes Nycteis, tied on Solidago as an experiment to see if eggs would be laid.

Lycæna Lucia, two specimens got into the folds of the gauze, and were killed by spiders from the outside.

Some of our caged females were quite fresh, and as we thought we might get more eggs, sticks were bent over our potted plants, and they were caged and packed away in their basket for travelling. Amongst them were *C. Mandan* and the form *Eriphyle* of *Colias Eurytheme*. This last laid no eggs, and one only was obtained by a process which one of my correspondents calls "Egg laying extraordinary." It consists, simply, of gently pressing the abdomen of a female, which has died without laying eggs, until one, and sometimes two, perfect eggs are passed through the ovipositor. This method may, I believe, at some time, be useful in securing larvæ of rare species. My first female *Colias Interior* was taken in 1886, and died without laying. I then secured one egg, which hatched a few days afterwards; from not knowing the food-plant, however, it was lost. From a beautiful variety of *Papilio Turnus* I secured two eggs in the same way, both of which hatched. Fertile eggs were also got in this way from *Carterocephalus Mandan*, (and one of these was the only specimen I got through all its stages to full growth,) and from *Colias Philodice*.

There are one or two points which should be remembered when obtaining eggs and rearing larvæ. In the first place the females should not be left exposed to the direct rays of the sun; but it will be found sometimes that if a butterfly is sluggish, putting her in the sun for a short time will revive her and make her lay eggs. Confined females, whether over branches or potted plants, should always be in the open air. If females do not lay in two or three days they must be fed. This is easily done. Take them from the cage and hold near them a piece of sponge (or, Mr. Edwards suggests evaporated apple) saturated with a weak solution of sugar and water. As soon as it is placed near them they will generally move their antennæ towards it and uncoiling their tongues suck up the liquid. If they take no notice of it the tongue can be gently uncoiled with the tip of a pin when they will nearly always begin to feed. It is better to feed them away from the plant they are wanted to lay upon, for if any of the syrup be spilled upon the flower pot or plant it is almost sure to attract ants. I kept one female *Colias Interior* in this way for ten days before eggs were laid. When eggs are laid they should as a rule be collected at short intervals. They are subject to the attacks of various enemies—spiders, ants, crickets, and minute hymenopterous parasites. They may be kept easily in small boxes, but do better if not kept in too hot or dry a place. When the young caterpillars hatch they must be moved with great care to their food plant; a fine paint brush is the most convenient instrument. With small larvæ, or those which it is desired to examine often, glass tubes, or jelly glasses with a tight fitting tin cover, are best. These must be kept tightly closed and in a cool place. Light is not at all necessary, and the sun should never be allowed to shine directly upon them. If moisture gathers inside the glasses the top should be removed for a short time. Larvæ may also be placed upon growing plants. These can be planted in flower-pots and the young caterpillars kept from wandering, either by a cage of wire netting, or by, what I have found very satisfactory, glass lamp chimneys. These can be placed over the plant, with the bottom pushed into the earth, and then should have a loose wad of cotton batting in the top. This has the double effect of preventing too great evaporation of moisture and keeping its occupants within bounds. Some larvæ wander very much and climb with the greatest ease over glass, spinning a silken path for themselves as they go. When caterpillars are bred in the study it must not be forgotten that the air inside a house is much drier than it is out of doors amongst the trees and low herbage, where caterpillars live naturally. The amateur will require some experience in keeping the air at a right degree of moisture, when breeding upon growing plants. In close tin boxes or jars, where the leaves must be changed every day, there is not so much trouble. An important thing to remember with larvæ in jars, is to

thoroughly wash out the jars with cold water every day. If, however, a caterpillar has spun a web on the side and is hung up to moult, it must not be disturbed. In changing the food it is better not to remove the caterpillars from the old food, but having placed the new supply in the jar, cut off the piece of leaf upon which they are and drop it into the jar. If they are not near a moult, a little puff of breath will generally dislodge them. Some caterpillars, as *Papilio Turnus*, which spins a platform to which it retires after feeding, can best be fed upon a living tree out of doors, but must be covered with a gauze bag to keep off enemies. A piece of paper should be kept attached to each breeding jar or cage, upon which regular notes must be taken at the time, giving the dates of every noticeable feature, particularly the dates of the moults and the changes which take place in the form and colour at that time.

The following is a list of Diurnals, of which I have seen specimens, taken at Nepigon. Some of the species were only taken by one collector, but most of them by all of us. The following record is of Prof. Macoun's collection, made in the last week of June, 1884; Dr. Bethune's, in the third week in August, 1888; my own in the last week in June, 1887, the first week in July, 1888, and the first week in August, 1886. The collection made in the first week in July is of course the trip above recorded, when I had the able assistance of Mr. Scudder:

Papilio Turnus, L.—July—Eggs laid freely on aspen.

Pieris Napi, Esper. Winter form *Oleracea-hiemalis*, Harr. Bred from eggs laid in 1887, by the next form.

Pieris Napi. Summer form *Oleracea-vestiva*. Bred from eggs laid by above form upon *Arabis perfoliata*.

Colias Eurytheme, Bd. Summer form *Eurytheme*, Edw.

Colias Eurytheme, Bd. Winter form *Keewaydin*, Edw. Of 36 eggs laid by the form *Eurytheme*, which I brought to maturity this summer, 33 were *Keewaydin*, 2 *Eurytheme*, and 1 questionably *Ariadne*, Edw.

Colias Eurytheme, Edw. Winter form *Eriphyle*, Edw. Not uncommon; eggs laid upon white clover.

Colias Philodice, Godt.—Uncommon.

Colias Christina, Edw. One female taken by Dr. Bethune, identified by W. H. Edwards.

Colias Interior, Scud.—Abundant in July and August, particularly in blueberry barrens; certainly single brooded; females lay after being caged on white clover for a few days, but the young larvæ (over four dozen) would not eat this plant. Two beautiful albino females were taken.

Danaïs Archippus, Fab.—Two remarkable wrecks, with only fragments of their wings, were taken on 9th July.

Argynnis Cybele, Fab.—August.

Argynnis Aphrodite, Fab.—July, August.

Argynnis Cipris, Edw. Some specimens taken by Dr. Bethune have been given this name by Mr. W. H. Edwards; they resemble *Aphrodite*, but the brown area beneath hind-wing is more mottled in *Cipris*, not so solid as in *Aphrodite*, yellow showing in between the nervures. Mr. Edwards has bred this species from the egg and says that while the larva of *Aphrodite* is chocolate brown, when full grown, that of *Cipris* is mottled with brown and yellow, and is one of the gayest larvæ among the *Augynnidae*.

Argynnis Atlantis, Edw.—Abundant; July, August.

Argynnis Electa, Edw.—First taken here by Prof. Macoun. It is a smaller species than *Atlantis*, lighter in colour, and some specimens seem to resemble the western *Lais*. This is also taken in Colorado, and its occurrence here is remarkable.

Argynnis Myrina, Cram.—Abundant; eggs laid on 10th July hatched and hibernated at once, without feeding.

Argynnis Chariclea, Schneid.—This is a late species. Dr. Bethune took two perfectly fresh specimens, 21st August. It is abundant at Port Arthur, 65 miles farther west, in the beginning of September. Identified by Mr. W. H. Edwards.

Argynnis Bellona, Fab.—Abundant; a handsome form, much darker than the usual one. A very fine melanic variety was taken on 2nd August, 1886.

- Grapta Comma*, Harr. Winter form *Harrisii*, Edw.—Some hibernated females.
Grapta Faunus, Edw.—Several fresh specimens were taken by Dr. Bethune in August.
- Grapta Progne*, Cram.—Common.
Vanessa Antiopa, L.—Common.
Vanessa Milbertii, Godt.—Common.
Pyrameis Atalanta, L.—Common.
Pyrameis Huntera, Fab.—Very common. The females laid readily on the under side of *Anaphalis margaritacea*, the Pearly Everlasting. The small eggs were pushed beneath the down and attached to the epidermis of the leaves. Over 100 eggs were obtained.
- Pyrameis Cardui*, L.—Common; eggs and larva common on thistle. Mr. Scudder collected one larva upon *A. Margaritacea*, with larvæ of *P. Huntera*. I have also bred it from sun-flower, Burdock and a white-leaved *Artemisia*, common in gardens.
- Limenitis Arthemis*, Dru. Form *Lamina*, Fab.—Abundant, especially along the railway, where refuse had been thrown out from the dining cars.
- Chionobas Jutta*, Hub.—Two females taken by Prof. Macoun, on 28th June.
Chionobas Macounii, Edw.—Local, but abundant in Macoun's glade, June 28 to July 13, when only faded and torn specimens were found.
- Thecla Irus*, Godt.—One specimen; Prof. Macoun.
Thecla Titus, Fab.—One specimen; Prof. Macoun.
Chrysophanus Thoe, Bd. Lec.—Two specimens; Prof. Macoun.
Chrysophanus Florus, Edw. (?)—Five specimens; Prof. Macoun.
Chrysophanus Hypophleas, Bd.—Not uncommon.
Lycæna Couperii, Grote.—One specimen; July.
Lycæna Pseudargiolus, Bd. Lec. Winter form *Lucia*, Kirby.
Lycæna Pseudargiolus, Bd. Lec. Winter form *Marginata*, Edw.; July, common.
Lycæna Pseudargiolus, Bb. Lec. Summer form *Neglecta*; two specimens, Prof. Macoun.
- Lycæna Comyntas*, Godt.—Local; not uncommon.
Lycæna Scudderii, Edw.—Three specimens; Prof. Macoun.
Carterocephalus Mandan.—Not uncommon; eggs on grass.
Pamphila Hobomok, Har.—Abundant; July; eggs on grass.
Pamphila Hobomok, dimorphic female *Pocahontas*, Scud.—Abundant; July; eggs on grass.
- Pamphila Manitoba*, Scud.—Not uncommon; August; eggs on grass.
Pamphila ——— "Manitoboides".—Not uncommon; June, July; eggs on grass.
Pamphila Peckius, Kirby.—One fresh specimen, first emerged, July 12; eggs on grass.
- Pamphila Mystic*, Scud.—Abundant; July; eggs on grass.
Pamphila Cernes, Bd. Lec.—Abundant; July; eggs on grass.
Amblyscirtes Vialis, Edw.—Abundant; June, July; eggs on grass.
Nisoniades Icelus, Lintn.—Abundant; June, July; eggs on a rough-leaved willow.
Eudamus Pylades, Scud.—Not common.

Concerning the above the following points seem to me worth recording, as adding something to the known life-histories of the species mentioned.

Colias Interior.—The food plant of this species is a mystery. It was thought that all species of *Colias* would feed upon white clover. This, however, is not the case, for *Interior* certainly will not. Several eggs were obtained during the past summer from females, taken at Sudbury, Ont., and from others, sent down to me alive, by mail, from Mr. J. D. Evans. These females were packed inside a tomato can, with a piece of cardboard at one end, through which a hole had been cut. A cover of gauze let in light and air. Inside the can were some stems of clover to give the insects a foothold. They arrived in perfect order after their journey of 320 miles, and after having been fed laid eggs. I may mention here, that butterflies may be sent alive for long distances by mail if properly packed. I have received, during the past season, from Rev. W. A. Burman,

of Griswold, Manitoba, living specimens of *Cænonympha Inornata*, which travelled to Ottawa (1,460 miles) inside a letter in a small flat tin box. Two specimens were laid on their sides with a green leaf between them, and when the box was opened at Ottawa, four days afterwards, they flew briskly across the room to the window. Unfortunately these were both males, but no doubt females would travel as well. The eggs of *Colias Interior* take exactly one week before they hatch. The egg is much like that of *Colias Philodice*. The young larva is lighter in colour.

The eggs, about four dozen in number, were equally divided between Mr. W. H. Edwards, Mr. Scudder and myself. We all tried them with every kind of leguminous plant we could obtain; but all failed to get the larvæ to feed. Some eggs were left upon the clover where they were laid until they hatched; but they, like the others, refused to eat, and after wandering about for two days dried up. Some were placed in a refrigerator at once upon hatching, but they fared no better than the rest. It seems to me worth mentioning, however, that in one jar where young larvæ were confined with leaves of several plants, they all gradually congregated upon the leaves of a *Desmodium*, and three specimens spun a small crescent of silk, somewhat similar to the silken path spun by young larvæ of *Colias Eurytheme* and *C. philodice*, to the end of which they go to feed and upon which they retire to rest. These three larvæ which spun these little silken crescents also passed a tiny pellet of pink excrement. They would not feed, however. The only *Desmodium* available was *D. Canadense*, a hairy species, and it is possible they could not get at the leaf on account of the hairs. At any rate the indications are that *Desmodium* is a possible food plant. A confirmatory fact is that one of Mr. Scudder's larvæ did exactly the same as my three, and spun its little crescent upon a leaf of *Desmodium*. *Lathyrus ochroleucus*, *Astragalus*, *Vicia*, *Pisum*, *Trifolium* all were refused. Mr. Scudder tells me that in Europe a species of this genus feeds upon *Vaccinium*, and a noticeable feature of all the localities, where I have taken *Interior*, is that bushes of this genus are abundant. Should I be fortunate enough to get more larvæ I shall offer them this as food.

Chinobas Macounii.—Eggs, large, globular; rather higher than broad, flattened at top and bottom; coarsely ribbed from top to bottom with about twenty ribs, a few of which divide at the bottom; between these are zigzag furrows crossing from rib to rib. Eggs laid on 6th July hatched on 26th, the larva eating a narrow strip from the egg shell round the top and then pushing its way out leaving the egg-shell almost intact. Very few of the larvæ ate their egg shells. The young larvæ are larger ($\frac{1}{8}$ inch) than those of *Ch. Jutta*, and have the heads more hairy; there are also a few black spots about the head which do not occur in *Jutta*. Upon the head and body of both species are some curious mammiform hairs. The larvæ are very sluggish, and seem to like to perch upon dead leaves of grass during the daytime.

The first moult took place about 18th August, after which the larvæ were four lines in length. Head round, flattened in front, greenish white, punctured, bearing on each side three stripes continuous with the stripes on the body and composed of the black hollows of the roughened surface; the two upper stripes join at their tips just above the ocelli. General colour, dull, glaucous, greenish white, with brown stripes.

On segment 2, just above and anterior to the spiracles is, on each side in both this species and *Ch. Jutta*, one long thoracic bristle curved forward. Food, Carices and Grasses.

Carterocephalus Mandan.—Two eggs were laid, 12th July, upon common lawn grass (*Poa pratensis*) and one was squeezed from the abdomen of a dead female. The egg is rather small, conically hemispherical; rather higher than wide; pale green. Duration, 10 days. The young larva is white, with black head and thoracic shield. The mature larva is slender and minutely downy, pale green in colour, with a white head and six narrow white longitudinal stripes. Along the body are two complete and one incomplete series of curious epidermal organs in the shape of chitinous concave disks which are sometimes geminate on the abdominal segments.

Pamphila ——— ?—Amongst the more interesting of our captures were a few specimens of an exceedingly active skipper, which was found in greatest numbers upon the top of "The Ridge." This insect belongs to the "Comma Group" of the genus

Pamphila, and bears a somewhat close resemblance to *P. Manitoba*, for which reason we call it "*Manitoboides*." It occurs, however, six weeks sooner at Nepigon than an insect I take to be true *Manitoba*. As I do not wish to cause confusion by naming what may prove to be a described species, I refrain from further describing the perfect insect, but give below some notes on the egg and the larvæ after the third moult, and on the appearance of the young larva in the first two stages. Five eggs were obtained upon the grass, *Danthonia spicata*. These were laid upon the green leaves and were large and showy, of a dull, dead white, and of the same shape as those of *P. Hobomok*. Under the microscope the shell presents a surprising appearance, for it is covered all over with threads and much resembles a piece of ordinary printing paper under a magnifying glass. The shell of the empty egg is very thick, and it is with difficulty that the pentagonal and hexagonal cells on the surface can be made out. Eggs laid 10th July hatched upon 25th. There was no mottling with pink as in *P. Cernes*, and the only indication that the eggs were good was the gradually darkening head of the young larva which showed through the thick shell. The newly-hatched caterpillar is of a much yellowish shade of cream colour than either *P. Cernes*, *Mystic* or *Hobomok*. The head, thoracic shield and first thoracic foot, black. The whole body covered with knobbed hairs. Unluckily at the time the young caterpillars hatched I was moving into a new house, and my furniture and instruments all being packed up, my microscope was inaccessible, and the only observations I could make then were made with a Codrington lens. The shape of the young larvæ was sack-shaped, somewhat like the grubs of the Scarabæidæ; but not having the anal segments curved under the body. From the very beginning, when the young larvæ were placed upon a tuft of growing grass, they worked their way down to the bases of the leaves and kept out of sight. About four days after they hatched I lost sight of them, and it was not until 4th August that I found them again. They had evidently moulted, for instead of a yellowish white they had now assumed a delicate glaucous tint. By glaucous I mean an opaque white, with a faint bluish-green shade on the surface. The head, and spiracles, as well as the thoracic shield and first pair of thoracic feet were black as at first, making a continuous collar from the tip of one foot to the other. Down the centre of the back there was a green line, from the dorsal vessel showing through the skin. At this time they were transferred to a smaller tuft of grass consisting of small roots of *Agrostis vulgaris* and *Carex varia*. They seemed to eat either of these indiscriminately, and eating their way down into the heart of a shoot, would nibble the edges of the leaves all round them. Leaving home to attend the meeting of the American Association for the Advancement of Science, no note was taken of the date of the next moult. Indeed, I supposed that this, like some others, had died during my absence. One morning in the month of September, however, to my great pleasure, I found one of these larvæ snugly ensconced, head upwards, in a den it had eaten out of the centre of one of the shoots of sedge. When it emerged to feed I found it had quite changed its colour. In the beginning of October it came out of this den, and for some reason it did not return to it again, but climbed about on the grass and sedge, and before it had constructed another winter quarters the cold weather set in. In November it had spun together a few leaves of grass, but this seems to have been insufficient. Some warm weather in December caused a mould to spread all over the plant, and having decided that the caterpillar was dead, I placed it in alcohol. The following is a description of this larva after what I consider was its third moult:—

Length, 7 lines. General colour, greenish-brown, with head, thoracic shield and thoracic feet black. Head round, larger than either of the first three segments, very coarsely punctured and thickly invested with short pointed bristles. About the mouth-parts a few long bristles. Thoracic shield black on a pale collar, and having two longitudinal furrows and bearing some truncate bristles just above the large spiracle on segment 2. The shield is divided by a transverse line which cuts off a small triangular piece of which the apex points downwards just over the spiracle. This triangle bears one long setaceous bristle similar to those on *Chionobas Jutta* and *Macounii* and also one concave disk of the same nature as those on *C. Mandan*. The whole surface of the body is minutely shagreened and has the raised portions darkened. Besides this the whole of the body but the head is covered with small black tubercles, each of which bears a short white trumpet-shaped

hair which is apparently stellate, or bears a few short teeth, at the top. On the thoracic shield these are rather longer than on the rest of the body, but less clubbed. On the last segments there are a few long bristles, particularly upon the anal flap. Beneath the body are also a few pointed bristles, upon the last two segments, and on the prolegs and thoracic feet. Thoracic feet black and bristly. Spiracles black and distinctly protruding (in the dead specimen). Concave disks. This species also bears two series of the processes mentioned under *C. Mandan*. In this instance, however, they are more like annuli. The edges of the disks being raised and black. They are arranged as follows: There are two series, all of which, except the pair on the base of the thoracic shield and a pair on the anal-flap, are below the spiracles. On seg. 2, above spiracle and on base of thoracic foot. Segs. 3 and 4, on base of thoracic foot, large. Seg. 5, just below second stigmatal fold, large; above it is what appears to be another disk, but which bears a truncate hair twice the ordinary length. Seg. 6—On upper stigmatal fold, in the same place as the bristle on previous segment, and below lower stigmatal fold. Segs. 7 to 10—On upper stigmatal fold and just above the foot of each proleg. Seg. 11—One large disk below stigmatal fold having just above it a similar one from which comes a long pointed bristle. On one side of the body this tubercle bears two bristles. Those on the feet each have below them two similar bristle-bearing disks. Seg. 12 has one large disk with two or three bristle-bearing tubercles round it. Seg. 13 has a small one at the base of the second stigmatal fold in a line with the spiracles, and also another small pair above, one on each side of the anal-flap.

P. Cernes, B. L. (*Limochores taumas*, Fab.)—The form of this species which occurs at Nepigon is very dark, so dark as frequently to have been mistaken for *A. Vivilis* when we were collecting. Several females were caged over a tuft of cut-down *Avena striata* and five eggs were secured on 10th July. These were all laid loose amongst the dead leaves on the ground. Hemispherical, dull ivory white, large for the size of the species—larger than those of *P. Mystic*. The surface of the shell finely netted all over with irregular pentagonal and hexagonal cells. On 16th, the surface became mottled with ruddy blotches and two or three days later the dark head of one of the young larvæ began to be apparent, it hatched on 23rd July. The young larva was cream colour at first with a black head and thoracic shield. After the first moult, which took place on 30th July, it was darker on the anal segments, and after the second moult, on 4th August, was quite rusty brown over the last segments. On 13th August it moulted the third time, and then the colour of the whole body changed to a dark brown, and the length was a quarter of an inch. On 29th August the fourth moult took place, and the following description was taken on September 8th:—Length when walking, 1 inch. General colour, rich purplish-brown with a green tinge showing through the transparent skin. Contractions of dorsal vessel plainly visible, giving the appearance of a dark-brown dorsal stripe. Surface of body finely mottled with grey and dark purplish-brown, and, like the head and thoracic shield, covered with a fine short black pubescence. Head black, coarsely punctured and pubescent. The thoracic shield black and shining, reaching from the spiracle on one side of Seg. 2 right round to the other. This is very conspicuous by reason of being placed upon a milk white collar. The spiracles black, on Seg. 12 large and high up, giving with some marks on anal flap the appearance of a bear's face. On anal flap the dorsal stripe ends in a blackish triangle, on each side of which are two small sub-dorsal black comma-like dashes, running backwards half way to the exterior margin of the anal flap, which is black above, whitish beneath. Down the back are two rows of tubercles, sub-dorsal and lateral, which perhaps answer to the concave disks of *C. Mandan*. As there was only one of these young larvæ, I kept it in a glass tube for better examination, and it turned out to be a very interesting captive. Instead of making a tent by catching the opposite edges of leaves together, it spun a nest against the side of the bottle and would extend itself from the nest and eat its food. After third moult, it was removed to a tin-topped jelly glass. Here, too, it spun a cocoon-like nest from which it reached forth and ate its food. On September 8th it appeared sluggish and I thought it was going to pupate. It was almost an inch long and I knew must be full grown, so it was placed in a tuft of grass, where it very soon spun a cocoon amongst the leaves close

to the root and remained in a semi-torpid condition, sometimes coming out on warm days and eating a little. On 13th October I found that it had pupated, and I was thus in possession of the complete life-history of the species. The chrysalis which was contained in a light cocoon about an inch long, made by catching a few blades of grass together and lining them with silk, was almost erect and seemed to be kept from lying against the cocoon by a few strands of silk. Chrysalis six lines in length, head-case square in front, eye-cases large and bold, between the eyes and on each side of them are tufts of tawny hair, with which the thorax and abdomen are also invested. Wing, leg and antenna cases smooth. Abdomen at 3rd segment covered laterally by the wing-cases and slightly wider than thorax or eyes. On segments 4, 5, 6 of the abdomen, beneath, the prolegs of the caterpillar are still visible. Meso-thorax tumid and bearing upon its anterior margin, behind the eyes two elevated tuberculated prominences, in front of which in the furrow between the pro- and meso-thorax is the opening of the thoracic spiracle. Wing-cases extending to the middle of the 4th abdominal segment, from their apices the tongue-cases run free and disconnected to the posterior margin of the 7th abdominal segment. There are also two shorter and wider cases which exceed the wings and run free to the posterior margin of 5th abdominal segment. These are probably the extremities of the cases of the metathoracic pair of legs. Upon the dorsal surface of the abdomen are two series of small concave disks, a sub-dorsal anterior series and a lateral posterior series, one pair upon each abdominal segment. Cremaster consisting of a few large rounded hooks. The colour of the head, leg- and antenna-cases, black. Wing-cases at first green and afterwards greenish-black. Pro-thorax black. Meso and meta-thorax brown. Abdomen light brown.

All grasses offered were eaten readily, *Panicum Crus-Galli* and *Triticum repens* perhaps with the greatest avidity, and *Phelum pratense* with the least.

Amblyscirtes Vialis, Edw.—This pretty little butterfly was caged on 9th in a tomato can, and the same day five eggs were secured, white shaped like those of *C. Mandan*, but rather larger. All were laid upon the green leaves of a cut down tuft of *Avena striata*. The young larvæ hatched on 20th, pretty little white caterpillars with black heads. As soon as they were placed on a tuft of *Poa pratensis* they crawled up to the tip of a blade and made a tent by drawing the opposite sides half way together with one strong strand of silk. Here they remained about five days, eating a little from the edge of the leaf and then disappeared. Their tuft of grass was left uncovered, and I think they were killed by the dryness of the air. They should have been covered with a glass.

Nisoniades Icelus, Lint.—A female of this species tied upon willow (*Salix cordata*) laid one beautiful greenish winged and netted egg on 10th July. This was the same as had been found upon willow bushes in the open and supposed to belong to this species, but the origin of which was now proved. My young larva was unfortunately drowned two days after hatching. Mr. Scudder carried his to the third stage. The eggs are laid upon the upper surface of the topmost leaves of willow bushes from six to eight feet from the ground, and were only found upon the willow above mentioned, which has rather rough pubescent leaves.

