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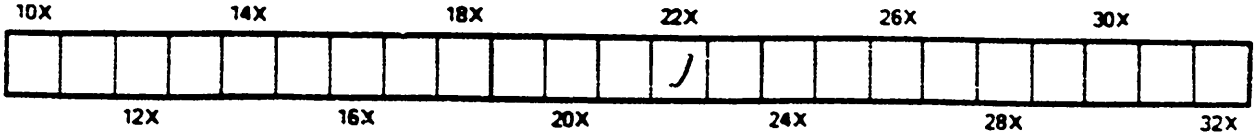

# The Canadian Entomologist.

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## NOTES UPON SOME BUTTERFLY EGGS AND LARVÆ.

BY THEODORE L. MEAD, NEW YORK.

During the past month (July) I have endeavored to obtain the eggs and larvæ of some of the butterflies common near this place (Hunter), in the Catskill Mountains, and have met with considerable success.

The most interesting discovery was that of the food plant of *Phyciodes tharos*, which had baffled all my endeavors for the past four or five years, during which time Mr. Edwards and myself have tried a great number of plants without avail.

Once, indeed, as has been recorded in a previous volume, we obtained a number of eggs from females enclosed in a glass jar with grass, but the larvæ refused to feed and died.

This summer, remembering that the congeneric *nycteis* and *Harrisii* feed on Compositæ, I prepared a large box by partly filling it with earth and transplanting into this small specimens of all the common Compositæ I could lay my hands upon. The box was covered with gauze and about a dozen ♀ *Phyciodes marcia* and *tharos* introduced. In a few days I examined the leaves and found six patches of eggs upon one of the plants, the number of eggs in a patch varying from twenty to about one hundred and fifty. The plant proved to be a species of Aster, very common here in wet places and by the roadside; no specimens are in bloom as yet (Aug. 2nd), but from the leaves I think it will prove to be *Aster Novæ-Angliæ*. No eggs were found on any of the other plants. After finding these, I transferred the females of *marcia* which still remained alive to a smaller box with living food-plants; these have now laid several more large patches of eggs.

On the 31st of July I succeeded in finding a brood of young caterpillars upon a plant of this Aster growing in a damp meadow. The larvæ feed upon the under side of the leaf in the same way as those of *nycteis*, leaving the upper surface untouched. Those of the first moult

are merely hairy, in the second moult the spines are already distinctly seen. Around one cluster of the larvæ a green spider had drawn his net and taken up his abode among them, no doubt finding it very convenient to have his prey within such easy reach. Probably the ravages of spiders are more destructive to this species than almost any other cause, since the eggs are deposited near the ground, in places where spiders are always very numerous.

Mr. Edwards also has females of *Ph. marcia* set for eggs, and hopes to determine the relationship, if any, between this species and *tharos*.

In obtaining eggs of *Limenitis arthemis* I have also been very successful, partly, I think, on account of a method of keeping the parent butterflies in good health and spirits, devised some years ago, and which has given very satisfactory results.

A notch is cut in the side of any empty wooden box, through which a branch of willow or other appropriate food-plant is passed, care being taken to select a leafy spray so as to partially fill the box with foliage; it is then covered with gauze, tacked fast on one side and part way on the adjoining sides, that on the fourth side being held down by a piece of wood fastened to the remaining flap of gauze. This renders easy the examination of the contents at any time. Now a saucer of raw dried apples, sugared and partly filled with water, is put in and the cage is complete. Butterflies like *L. arthemis* will live in such a vivarium for two weeks and more after their capture, and appear to enjoy the food provided immensely, laying many more eggs than if enclosed in a bag and allowed to perish of hunger and thirst.

I have often captured specimens and dropped them in upon the pile of dried apples; instead of fluttering about and endeavoring to escape, they instantly unrolled their tongues and feasted for several minutes upon the repast prepared for them, without a motion of the wings.

So far, my fifteen females of *L. arthemis* have laid a very large number of eggs, probably over five hundred, and many of them are still alive. The butterflies at first observe their usual custom of depositing the eggs upon the tips of the leaves, but become reckless after a while and lay them anywhere. I counted considerably over one hundred upon the cloth covering the box.

I had the rare good fortune to catch also a female of *L. proserpina*, which has laid 31 eggs.

By next summer Mr. Edwards and myself hope to settle the question as to the dimorphism of *L. arthemis*, by rearing the caterpillars from these eggs; as about one-twentieth of the specimens seen are *proserpina*, if we are reasonably successful in carrying them through the winter, we are sure to obtain both forms from each kind of parent, if this is really a case of dimorphism.

Two years ago I captured a specimen here, intermediate in marking between *arthemis* and *proserpina*, and this year I have taken another, but these varieties are exceedingly rare.

The period between the laying and hatching of the egg is about seven days; the young larva, as has been observed with other species of *Limenitis*, makes its way to the tip of the leaf and there eats on both sides of the midrib, usually resting on the projecting end of this. On my box I notice that where two larvæ are hatched upon one leaf, the second comer constructs a narrow perch for himself from the side of the leaf, and rests upon it. These perches are nearly a quarter of an inch long and about one-fiftieth of an inch in diameter; they are irregularly cylindrical, and composed of frass and small bits of the leaf, fastened together and covered with grayish silk.

Besides these eggs I have many of *Satyrus nephele*, and obtained a few of a small species of *Nisoniades*. The parent was too much battered and broken to be surely identified, but I believe it to be *lucilius*. The eggs were deposited on willow; they are oval and have ten strongly projecting upright ribs, these and the space between them being marked with transverse raised lines. In color the eggs are yellow, soon changing to claret-red. The young larva, soon after hatching, eats a narrow slit from the edge of the leaf inward, soon turning at an angle, and then the flap of leaf is bent over and fastened with silken cables so as to afford shelter to the caterpillar. I have sometimes found, in previous seasons, half grown larvæ of some Hesperian on the poplars and willows here, hiding between two leaves lightly fastened together, and probably this is the habit of the species in question as it grows up.

———:o:———

PIERIS RAPÆ.—This troublesome pest to the cabbage grower is rapidly spreading westward. During the past month (August) it has appeared in considerable numbers in this neighbourhood (London, Ont.,) and is fast becoming one of our commonest butterflies. Already reports are coming in from all quarters of damage done by the larvae. We hope its little parasite, *Pteromalus puparum*, will soon follow in its wake.—ED. C. E.

# THE EFFECT OF THE GLACIAL EPOCH UPON THE DISTRIBUTION OF INSECTS IN NORTH AMERICA.

BY AUG. R. GROTE, A. M.

*(Read before the American Association for the Advancement of Science, at Detroit, Aug. 10th.)*

From the condition of an hypothesis the glacial epoch has been elevated into that of a theory by the explanations it has afforded to a certain class of geological phenomena. The present paper endeavors to show that certain zoological facts are consistent with the presence, during past times, of a vast progressive field of ice, which, in its movement from north to south, gradually extended over large portions of the North American continent. These facts, in the present instance, are furnished by a study of our Lepidoptera, or certain kinds of butterflies and moths now inhabiting the United States and adjacent territories. Before proceeding with the subject, a brief statement of phenomena, assumed to have attended the advent of the glacial epoch, is necessary.

At the close of the Tertiary, the temperature of the earth's surface underwent a gradual change by a continuous loss of heat. The winters became longer, the summers shorter. The tops of granitic mountains in the east and west of the North American continent, now in summer time bare of snow and harboring a scanty flora and fauna, became, summer and winter, covered with congealed deposits. In time the mountain snows consolidated into glacial ice, which flowed down the ravines into the valleys. Meanwhile the northern regions of the continent, which may have inaugurated, submitted extendedly to the same phenomena. Glacial ice, first made on elevations, finally formed at, and poured over, lower levels. Glacial streams finally united to form an icy sea, whose frozen waters slowly plowed the surface of the rocks, and whose waves, in their movement from north to south, absorbed the local glacial streams in their course, and extended over all physical barriers into the Southern States and down the valley of the Mississippi. Before this frozen deluge the animals must always have retreated. The existing insects of the Pliocene must, in submitting to the change of climate which accompanied the advance of the glacier, have quitted their haunts with reluctance, and undergone a severe struggle for existence, no matter how gradually they

had been prepared for the encounter. We may expect that multitudes of specific forms ultimately perished, of whose remains no traces have been preserved.

Such being a brief statement of the outlines of the opening of the glacial epoch, we turn to some facts offered by a study of certain of our existing species of butterflies and moths.

The tops of the White Mountains and the ranges of mountain elevations in Colorado, offer us particular kinds of insects, living in an isolated manner at the present day and confined to their respective localities. In order to find insects like them we have to explore the plains of Labrador and the northern portion of the North American continent, in regions offering analogous conditions of climate to those obtaining on the summits of these mountains. The genera *Oeneis* and *Brenthis* among the Butterflies, and *Anarta* and *Agrotis* among the Moths are represented by the same or similar species in all of the above mentioned localities. In the case of the White Mountain butterfly, *Oeneis semidea*, we have a form sustaining itself on a very limited Alpine area on the top of Mount Washington.* Although there is some doubt that precisely the same form of *Oeneis* has been discovered in Colorado, the fact remains that *Oeneis* butterflies exceedingly like it, though registered by us under different specific names, live in Labrador and Colorado. Whether the White Mountain butterfly, *Oeneis semidea*, be, as suspected by Lederer, a modification of some of the Labradorian forms of the genus, or not, the geographical distribution which its genus enjoys cannot be meaningless. The question comes up, with regard to the White Mountain butterfly, as to the manner in which this species of *Oeneis* attained its present restricted geographical area—How did the White Mountain butterfly get up the White Mountains? And it is this question that I am disposed to answer by the action attendant on the decline of the glacial epoch.

I have before briefly outlined the phenomena attendant on the advance of the ice-sheet, and I now dwell for a moment on the action which must equally be presumed to have accompanied its retirement. Many of the

* See Mr. Scudder's article in the "Geology of New Hampshire," 1, 342. Mr. Scudder first pointed out the existence of Alpine and sub-Alpine faunal belts on Mount Washington, and interestingly remarks, "that if the summit of Mount Washington were somewhat less than two thousand feet higher, it would reach the limit of perpetual snow."

features of its advance were repeated, in reverse order, on the subsidence of the main ice-sheet or glacial sea. The local glaciers appeared again, separate from the main body of ice, and filled the valleys and the mountain ravines, thus running at variance with the main body of the glacier, being determined by local topography. A reversal of the temperature shortened the winters and lengthened the summers. Ice-loving insects, such as our White Mountain butterfly, hung on the outskirts of the main ice-sheet, where they found their fitting conditions of temperature and food. The main ice-sheet had pushed them insensibly before it, and during the continuance of the glacial epoch, the geographical distribution of the genus *Oeneis* had been changed from a high northern region to one which may well have included portions of the Southern States. And, on its decline, the ice-sheet drew them back again after itself by easy stages; yet not all of them. Some of these butterflies strayed by the way, delayed by the physical nature of the country and destined to plant colonies apart from their companions. When the main ice-sheet left the foot of the White Mountains, on its long march back to the pole, where it now seems to rest, some of these wayward, flitting, *Oeneis* butterflies were left behind. These had strayed up behind the *local* glaciers on Mount Washington and so became separate from the main body of their companions, which latter journeyed northward, following the course of the retirement of the main ice-sheet. They had found in elevation their congenial climate, and they have followed this gradually to the top of the mountain, which they have now attained and from which they cannot now retreat. Far off in Labrador the descendants of their ancestral companions fly over wide stretches of country, while they appear to be in prison on the top of a mountain. I conceive that in this way the mountains may generally have secured their alpine animals. The glacial epoch cannot strictly be said to have expired. It exists even now for high levels above the sea, while the Esquimaux finds it yet enduring in the far north. Had other conditions been favorable, we might now find Arctic man living on snow-capped mountains within the Temperate zone.

At a height of from 5,600 to 6,200 feet above the level of the sea, and a mean temperature of about 48 degrees during a short summer, the White Mountain butterflies (*Oeneis semidea*) yet enjoy a climate like that of Labrador within the limits of New Hampshire. And in the case of the moths an analogous state of things exists. The species *Anarta melanopa* is found on Mount Washington, the Rocky Mountains and Labrador. *Agrotis islandica* is found in Iceland, Labrador, the White Mountains, and, per-

haps, in Colorado. As on islands in the air, these insects have been left by the retiring of the ice-flood during the opening of the Quarternary.

On inferior elevations, as on Mount Katahdin, in Maine, where we now find no *Oeneis* butterflies, these may formerly have existed, succumbing to a climate gradually increasing in warmth from which they had no escape; while the original colonization, in the several instances, must have always greatly depended upon local topography.

In conclusion, I have briefly endeavored to show, that the present distribution of certain insects may have been brought about by the phenomena attendant on the glacial epoch. The discussion of matters connected with this theoretic period of the earth's history still, as it now appears, brings out more and more clearly the conception of its actuality. I hope that my present statements may draw the attention of our zoologists more to the matter, seeing that we have in our own country fields for its full exploration. And I permit myself to entertain the belief that testimony as to the former existence of a long and widely spread winter of the years, is offered in evidence through the frail, brown, *Oeneis* butterflies that live on the tops of the mountains.

## METHODS OF SUBDUING INSECTS INJURIOUS TO AGRICULTURE.

BY JOHN L. LECONTE, M. D., PHILADELPHIA.

*(Read before the American Association for the Advancement of Science, at Detroit, Aug. 10th.)*

In accordance with the predictions made at the time of its first appearance in the immediate Mississippi Valley, the Colorado potato beetle continues to extend its area of distribution. It has during the last and present seasons reached the Atlantic coast of the Middle States, and is preparing an invasion in mass of the maritime parts of New England, which will soon be overrun with the same ease with which it has conquered the Western and Middle States. Meanwhile the farmers are anxiously inquiring for means of destroying the invader. Materials destructive to the insects and said not to be injurious to the plant or the soil, have been recommended almost without number; but with the

exception of Paris green, they have been either very insufficiently tried or found inoperative. That compound of arsenic and copper therefore remains naturally the favorite, notwithstanding its dangerous qualities and the possible deleterious effect it may produce on the fields after long use.

Entomologists and other scientific men are often asked: "Why do you not give us another remedy against this destructive insect? Are you baffled with all your boasted progress in learning by the invasion of a wretched little bug?" No, my friends, we are not baffled by the wretched little bug, but in our endeavors to teach you how to dispose of it in such a manner as to protect your crops, we are embarrassed by your own failure to grasp the magnitude of the problem which you have set us to solve. Had you indeed comprehended the warnings given by my lamented friend B. D. Walsh, on the first injurious appearance of the insect, and since repeated by many Entomologists, you would have insisted several years ago that the subject should be investigated with a power of inquiry proportioned to its importance, and you would have received such information as might with proper and well directed industry on your part have prevented much loss.

However, I do not wish now to speak of the past; it is gone and its errors cannot be undone. Let us rather enquire what shall be done in the future.

The first thing, then, is to cease calling upon science for a remedy, when science and empiricism have probably already given you many remedies, concerning the application of which I will have a word to say by-and-by. Science can help you and will help you only when you have begun to help yourselves. How, then, can we begin to help ourselves? I hear you ask. First, then, there should be a scientific commission, selected by competent scientific authority for their merit and not for their political influence. Politicians have had too much control over our agricultural interests, as you all have reason to remember with regret. This commission should be sufficiently large to subdivide the subjects committed to them in such manner as to thoroughly investigate the habits and times of appearance in different districts of the great agricultural pests, the effect upon them of all the cheaper materials which have been or may be judiciously suggested as destroying agents, and the proper times and manner of applying them. The members of the commission should also receive sufficient compensation to warrant them in giving as much time and labor to this investigation as may be required, even to the

temporary abandonment, if necessary, of their other scientific or secular pursuits. No such task can be properly performed and completed by the solitary labors of State entomologists underpaid and overburdened with work. Only by association of several such careful observers and investigators can a worthy, useful result be obtained for the suppresion of several of the most formidable pests.

2. This information being procured, should be tabulated as far as possible, or at least reduced to a compact form for easy reference and widely published in newspapers and also in pamphlet form.

3. By the distribution of this information and by appeals through the newspapers and agricultural journals, as well as by addresses at meetings of farmers and others interested in agriculture, it must be impressed upon the public mind that all individual efforts for the suppression of these pests are frequently futile. Only combined and consentaneous action over large tracts of country will be effective.

Now, while I am prepared to believe that when these facts are made known to the farmers they will immediately see the importance of the suggestion for unanimous and simultaneous advance upon the enemy, yet without legislative aid it will be quite impossible to secure the organization requisite for an effective onslaught. It will therefore be necessary for the citizens interested to command their representatives, either in State Legislatures or in National Congress, to prepare proper laws for the destruction of these pests at stated times, to be determined and recommended by the scientific commission. These laws will be not only cheerfully obeyed by every intelligent farmer, but I know that the farmers as a class will be glad to have such laws enacted and enforced with penalties for their neglect. Those disposed to help themselves and each other can only thus be protected against an ignorant or indolent neighbor, whose thriftlessness would otherwise make of his potato patch, his cotton field or his plum orchard a nuisance nursery from which no industry could protect the surrounding farms.

Thus, then, the organization necessary for a successful campaign against our insect enemies must be authoritatively demanded by you. Under less free forms of government the plan which I have suggested would probably have long ago been perfected by the rulers. Even the fear of the extension of the Colorado potato beetle to Europe has excited in several countries almost as much discussion and confusion of counsel as an apprehended revolution.

The fact is, that these incursions and ravages of hostile insects represent a condition of *war*. It is only by a quasi-military organization and appropriate weapons suited to the nature of the enemy that they can be conquered. Without recognition of this fact nothing can be done against them, and we must bow our heads and exclaim with the pious Mohammedan fatalist, "It is the will of God."

Three subjects yet remain to be considered—the materials to be used, the time of making the attack in force, and the weapons to be employed.

1. The materials may be either vegetable or mineral, or merely human labor intelligently and persistently applied. The latter is the only effective means of contending against some insects, but in all cases it is a necessary adjunct to the remedies used. These remedies are very numerous, and until a careful investigation is made of the large number already suggested, no proper indications can be given except that those least injurious to man should be preferred, even at greater cost of money and labor; and that those which kill the insect by contact with its body are likely to prove more effectual than those which destroy by poisoning its food. It may be here observed that the form of apparatus in these two cases must be quite different. In the latter, any contrivance which will sprinkle a fluid or dust a powder on the exposed or upper surface of the leaves will be sufficient; in the former, in which the poison kills by contact with the insect, it must be able to reach the enemy wherever sheltered.

2. The time of attack must naturally be when the enemy is least able to resist. To quote again from the excellent memoir of Motschulsky, "the most effective and at the same time the easiest mode of opposing the developement of the locusts is the crushing out of the young broods when collected in swarms in the place where they are hatched. Consequently the most important thing is to know the nesting place of these destructive pests. In order to discover them and to point out the course to be pursued * * it might be well to send skilful persons * * to make the necessary researches, and these, with the assistance of the local authorities, might seek out the places where the insects abound and establish the necessary regulations for their destruction." (l. c. p. 228.) In the case of the cotton moth it is plain that the attack should be made upon the earliest broods, which are said to appear in the extreme southern part of the country, and from which the migratory swarms which travel northward are supposed to be developed; also, that the attack must be directed against the caterpillars rather than the perfect insects.

The Colorado potato beetle may also be attacked with greatest success in the larval state. The integuments are then soft, and the appetite more voracious, so that whether the poison by contact or the poison by food be used, it will have a more certain effect than upon the perfect insect, which is protected against the former by the hard chitinous surface and against the latter by preoccupation in reproductive duties.

You will be prepared to admit the importance of the recommendation above made, that the times for making the attack should be directed by the scientific commission after full examination of the habits of the insects and the dates of their appearance in their various stages of developement. These dates will vary in different districts, and without a carefully tabulated calendar of the necessary facts, no system of combined effort, such as I believe to be essential, can be planned.

The apparatus to be used must of course vary greatly with the habits of the insects to be attacked. In the case of the plum curculio canvas frames propelled on a kind of wheelbarrow, with a ram to concuss the trunk of the tree, is probably the best instrument yet devised. The insect will fall into the net when the tree is struck, and may be easily destroyed when a sufficient mass has been collected. For the cotton moth and the potato beetle the apparatus for poisoning the leaves upon which they feed may be any simple sprinkler or dusting box, according as liquid or solid poison is employed. But for direct application to the insect itself, we must use means by which a fine spray will be driven with force sufficient to envelop the whole plant, or the surface of the ground upon which the insects are assembled, in a mist of poisonous liquid. Such an instrument is the atomizer, which has the additional advantage over the sprinkler that it consumes less liquid. The first application of the atomizer for the destruction of insects was made by me several years ago, and in the *American Naturalist* for August, 1869, I published a short paper recommending its use with certain poisonous liquids for the disinfection and preservation of insect cabinets. I have seen its frequent use with great success.

When the question of locusts became of importance last year, and the Colorado potato beetle began to be very troublesome in the Atlantic States, I spoke with several commercial friends and others about the propriety of making atomizers of large size for the destruction of these pests. In consequence of delay in the measures they thought necessary to command the attention and security of a manufacturer, no progress

has yet been made for introducing such a contrivance into general use. Meanwhile a small apparatus consisting of an atomizer, a tank of fluid supported on the back, and a pair of bellows fixed at the side of the operator, has been independently introduced by a manufacturing establishment in Philadelphia, and I have been told is somewhat of a favorite. It will doubtless be useful to a limited extent, and is not patented I believe.

For small arms, this or a somewhat larger and more complete instrument will answer, but in the war against insect pests in which I have endeavored to interest you, we must have heavy ordnance as well as weapons for hand use. Large compound atomizer tubes, with five, ten, twenty, or, in fact, an indefinite number of orifices for producing the spray, can be made, connected with large tanks of fluid and worked by a powerful current of air from a revolving fan, driven by man, horse or steam power, according to the size of the instrument. When of sufficiently large size, the machine can be mounted on wheels and transported wherever it would be required for use. Before such instruments as these an invading army of caterpillars, or even a recently hatched swarm of locusts, would be annihilated. A comparatively small number of men would be required to work a battery of this kind of field artillery, and it would be found immensely effective.

The organization recommended can be effected only by the strong appeal of the people where agricultural interests dominate, for proper instruction from the government and proper protection by legislative power. We have game laws to protect our useful wild animals; thistle laws to guard against extension of noxious weeds. Why not have insect laws for destruction of agricultural pests?

Farmers of the West, are you willing to exert yourselves to procure this result? The prize is a rich one—it is no less than immunity from an annual destruction of property quadruple or sextuple that of the great Chicago conflagration.

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## ON A CANADIAN SPECIES OF AGROTIS.

BY A. R. GROTE, BUFFALO, N. Y.

Mr. George Norman has sent me specimens of a species of *Agrotis* allied to *tessellata*, which were taken at Orillia. I propose to call the species *Agrotis versipellis*. The male antennæ are brush-like, eyes naked,

all the tibiae spinose. The thorax and tegulae are dark brown; collar with a blackish shade in front, below which it is ashen. Head and tips of palpi grayish brown; 2nd palpal joint outwardly blackish. Fore wings blackish brown; lines geminate, distinct, with pale included shades. *Median vein narrowly striped with white.* A whitish shade over subcostal nervure. Claviform rather small, distinctly black-edged. Stigmata smaller than in *tessellata*, grayish brown, the cell between them, and before the ovate orbicular, blackish. Median space of a clearer brown below the median vein. Course of the median lines much like *tessellata;* the t. p. a little more exserted opposite the median nervules. Subterminal line a nearly straight gray shade, thus differing decidedly from *tessellata.* Hind wings blackish fuscous, a little paler at base, with paler fringes and reflection of the discal lunule from beneath, where both wings are blackish fuscous and show a faint common line. *Expanse* 30 m. m.

This is a handsome species and seems to be easily distinguished from its ally by the white median vein. It seems intermediate between *tessellata* and *Ridingsiana.*

I have been shown in Detroit, by Mr. J. A. Lintner and Mr. O. S. Westcott, specimens of an *Agrotis* new to me, but which I thought might prove the true *obeliscoides* of Guenée, from my memory of his description. This is in so far interesting, as I have been disposed, in the absence of another species, to consider *sexatilis* as the species intended by Gueneé.

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## ON CERTAIN SPECIES OF MOTHS FROM FLORIDA.

BY A. R. GROTE, BUFFALO, N. Y.

The following species were collected by Mr. Schwarz and Mr. Bela Hubbard, of the Detroit Scientific Association, among other most valuable scientific material, obtained during a recent visit to Florida.

*Megathymus yuccae* (Bdv. & Lec.) Scudd.

The eyes are large and naked; caputal squamation of mixed flattened scales and hair. I cannot find any ocelli. The cylindrical, scaled antennæ are capitate, without terminal inflection or hooklet. The tibiæ and tarsi are strongly spinose; hind and middle tibiæ with terminal claw. I regard the insect as belonging to the Castnians, where it is placed by Walker. The ornamentation mimics the Hesperians.

Haulover, Fla., March 8.

*Aegeria floridensis, n. s.*

♂. Seems to belong to a new structural group, for which I propose the name *Pyrrhotaenia.* The antennæ are heavy, lengthily pilose, brush-like. The naked eyes are banded black and golden, narrowed superiorly. The ocelli are large. The head is narrow, prominent; palpi curved, long, ascending, free from the front; maxillæ moderate. Anterior wings scaled, very narrow, widening terminally at outer third, blackish violaceous. The narrow portion of the wing is medially orange red, interrupted by the ground color at beyond the disc. Beyond the interruption the interspaces are orange red for a short space; the internal margin to terminal third is narrowly streaked with orange red. Beneath largely shaded with orange; the violaceous terminal portion of the wing interspaceally rayed with orange. Hind wings pellucid, with narrow orange costal border and blackish fringes. Head covered with broad blackish violaceous scales antennæ violaceous. Palpi and collar orange. Legs violaceous, marked with orange; hind tibiæ twice broadly banded with orange. Abdomen blackish cyaneous, with a concolorous terminal tuft containing a few white scales; two terminal segments banded with orange, fourth from the tip orange banded, this color extending beneath.

*Expanse of fore wing*, 6 m. m. *Total length of body*, 9 m. m.

Enterprise, Fla., May 29.

*Cosmosoma omphale* Hübn.

Haulover, Fla., March 9.

*Syntomeida ipomaeae* Harris.

The discal dot is sometimes obsolete on the fore wings above.

Enterprise, Fla., May 28.

*Didasys, n.* g.

A form allied to the Cuban *Burtia.* The abdomen in the male provided with two lateral, elongate, pilose, blackish terminal tufts, one on each side, arising from the genital pieces, which latter are prominent, exceeding the anus, when closed forming a whitish U beneath, from the color of the scales. The large ocelli are removed from the somewhat narrowed, naked eyes. The plumose ♂ antennæ are thickly furnished with lengthy setose pectinations. Palpi moderate, pointed, exceeding the front. Shape of the wings as is usual in the group. The median fold of *Cosmosoma* is absent.

*Didasys Belae, n. s.*

Vertex, collar, base of the primaries and palpi orange; terminal palpal joints blackish. Antennae black; legs blackish, streaked with whitish and with whitish fore coxæ. Abdomen above orange scarlet, terminal segments with short lateral fluffy tuftlets, the terminal ones touched with black. Thorax and patagia black, neatly lined with pale. Abdomen beneath orange at base, the terminal portion whitish with blackish incisures. Fore wings pellucid; veins black marked. A wide black terminal band enclosing a series of six interspaceal orange yellow spots, arranged subterminally in a series following the shape of the terminal margin. An orange yellow discal spot narrowly edged with black. Internal margin blackish, narrowly streaked with yellow. Hind wings pellucid, with black borders and the costal edge narrowly yellowish. Beneath as above, the spots of a paler orange. The ♀ has a dorsal row of abdominal black dots; anal segments terminally brownish; the dorsal abdominal markings are very slightly shown by the ♂ on close inspection.

♂, Cedar Keys, June 4, expands 26 m. m.; the two terminal tufts are 3 m. m. in length.

*Dahana**, n. g.*

A form between the clear-winged Glaucopid genera and *Ctenucha*. The narrow primaries are one-third longer than the entire body. Both pair of wings are closely scaled, cyaneous black terminally, but mostly dead black. Antennae long, plumosely pectinate in the male, serrate in the female. Abdomen rounded terminally, without anal tufts in the male, short in both sexes and plump. Ocelli near the margin of the narrowed naked eyes. Palpi exceeding the front.

*Dahana atripennis, n. s.*

Face mixed cyaneous and yellow; orbits of the eyes, palpi at base, sides of the thorax in front dark yellow; terminally the palpi are black. Thorax beneath cyaneous, brilliant; above black with yellow edges to the patagia at base and streaked with cyaneous. Abdomen brilliant blue laterally at base, else orange above in the male, yellow in the female. Fore wings dull black, slightly blue outwardly in male, with a yellow fleck above internal angle. Hind wings cyaneous black above, with short pale fringes. Beneath fore wings more blue at base, with the yellow streaky

* Sanskrit: the Dawn.

shade at internal margin more diffuse. Hind wings immaculate beneath. Abdomen dusky along the venter.

Length of primary 18, of the body 12 m. m.

Enterprise, Fla., May 28.

The male is the more gaily colored, and has the blue reflections more noticeable.

*Hexeris enhydris, n. g. et sp.*

♀. There are no ocelli, and thus there is a resemblance to the Geometridae in a form resembling the Fasciatae in the long labial palpi. The cut of the wings rather resembles *Endropia.* The labial palpi are extended straightly forwards for more than twice the length of the head. The palpi are divaricate, the third joint linear, elongate, more than half the length of the second. Antennae simple, comparatively short; the genus seems distantly related to *Syllectra.* Fore wings 12 veined, no accessory cell; veins 7, 8, 9, thrown off near together from the upper extremity of the cell; cell incompletely closed; 5 nearer to 4 than to 6; 8 to apex. The position of 5 seems to me decisive, and that we have to do with a Noctuid. Hind wings 8 veined, 3 and 4 from one joint, 5 near 4; cell closed by a fold or obsolete vein; 5 hardly weaker than the rest. The divided frenulum indicates the sex of the specimen. The frenulum seems to be homologous with the marginal or sixth principal vein of butterflies. Mr. Scudder has pointed out to me that this number is sometimes present in the higher groups. The frenulum cannot be considered a specialized hair. I have before come to the conclusion that it represents a missing vein; the reason for its complexity in the female I cannot yet suggest. In the new form the legs are slender, long and unarmed. The entire insect is pale ochreous, shaded with rusty, and in color and ornamentation resembles some of the Geometridae. The fore wings have common wavy rusty lines, and are mottled or subreticulate in appearance. A median line bent at the middle of the wing, where it unites with an outer line from the costa, and thus sketching the figure of a crooked Y, is noticeable. Beneath the same markings come out, the broader rusty lines of the upper surface being reproduced on a yellowish ground. Length of fore wing 17 m. m.

Two specimens collected at Fort Capron, Fla.; the largest is before me. I am much indebted to Mr. Geo. Dimmock for his preparation of the wings of the specimen by a valuable process discovered by him, an account of which was read before the American Association for the Advancement of Science.

## MEETINGS OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

According to previous announcement, the first meeting of this club was held in the rooms of the Detroit Scientific Association, on the 10th of August, at 2 : 30 p. m., Dr. J. L. Leconte, President in the chair, Prof. C. V. Riley, Secretary. The attendance was large, including S. H. Scudder, Esq., Cambridge, Mass., Vice-President, and Messrs. A. R. Grote, Buffalo. N. Y., W. Saunders, London, Ont., B. P. Mann and E. P. Austin, of Cambridge, Mass., Prof. E. S. Morse, Salem, Mass., J. A. Lintner, Albany, N. Y., E. A. Schwarz, H. G. Hubbard and B. Walker, of Detroit, Dr. A. E. Dalrymple and Dr. J. G. Morris, Baltimore, Md., Prof. A. J. Cook, Lansing, Mich., Dr. Hoy, Racine, Wisconsin, Clinton Roosevelt and Geo. Dimmock, Springfield, Mass., B. D. Sanders, J. C. Holmes and Wm. Provis, Detroit, J. T. Ison, Cleveland, Ohio, and others.

President Leconte, in a few opening remarks, stated the objects had n view in the formation of this club. They were chiefly to cultivate closer personal relations among those interested in Entomological pursuits, many of whom were widely separated by distance, to exchange views and record observations, and to exhibit specimens of interest. He hoped that the meetings would not only be fruitful in these respects, but that, seeing the importance of Entomology in its relation to agriculture, some good to the country might flow from the deliberations.

Mr. Wm. Saunders mentioned the fact of the unusual scarcity of insects of the Saw-fly family (Tenthredinidæ) throughout western Ontario, especially those destructive to fruit, naming the Gooseberry Saw-fly *(Nematus ventricosus)* and the Pear Tree Slug *(Selandria cerasi)*. Both these insects, although enormously abundant and destructive in 1874, had been quite scarce in 1875. He called for suggestions as to the cause, his own impression being that this diminution had been caused by the severity of the late winter and spring.

Prof. Cook, of Lansing, Mich., had not observed any remarkable scarcity of these species in his neigborhood.

Prof. Riley had remarked their almost entire absence in some localities, and their comparative abundance in others.

Mr. A. R. Grote exhibited specimens of *Agrotis islandica* from the top of the White Mountains and from Labrador.

A lengthy discussion on nomenclature ensued, and was participated in by many of the members present, it being generally conceded that some action should be taken by the club, looking to the adoption of some rules or suggestions which might guide the Entomologists of the country on this perplexing question. On motion, Messrs. Scudder, Riley and Saunders were appointed a committee to take the matter of nomenclature into consideration and present it at a future meeting in such form as to offer opportunity for more definite discussion.

Mr. Scudder spoke favorably of *Psyche*, the organ of the Cambridge Entomological Club, and urged that members subscribe for it on account of its excellent bibliographical record.

Mr. Mann called attention to the difficulty of getting hold of State Reports, and thought there should be some system adopted by which these reports could be placed on sale, so that Entomologists who desired to do so might purchase them.

Mr. Saunders thought that if some plan could be devised whereby the valuable facts and suggestions contained in these various reports could be brought together, condensed into one volume, and made available to agriculturists as well as entomologists, that much good would result from it.

The President suggested that such a work might well be done by the general government, and would be much more valuable than the volume it now sends out.

On motion, it was resolved that this club request the American Association for the Advancement of Science to take such action as seems best calculated to secure the placing of State Reports upon scientific subjects in the library of the Association. The Secretary was instructed to bring this subject before the Association.

Dr. Morris referred to the scarcity of Sphingidae about Baltimore during the present season, an experience which was corroborated by other members present. Mr. Austin had found all insects unusually scarce about the White Mountains, where he had been collecting for the past two years. Mr. Riley thought the very severe and late winter and the unusually rainy summer in part explained the fact.

Mr. Scudder offered some remarks on the great abundance of the Army Worm *(Leucania unipuncta)* in portions of Massachusetts, as an

exception to the general rule of scarcity of insect life; he had made a calculation from the number counted in a square foot, that in a field near Cambridge there must have been as many as two million worms to the acre. Other members offered similar experience in reference to this species. Mr. Riley stated that the Army Worm generally abounds during a very wet summer following a very dry year.

Mr. Lintner referred to the great scarcity of *Orgyia leucostigma* as in striking contrast to its abundance last year in Albany.

The election of officers then took place, resulting in the re-election of Dr. John L. Leconte as President, Samuel H. Scudder, Vice-President, and C. V. Riley, Secretary.

Mr. Riley read a paper on "Locusts as Food," in which he gave his own experience in cooking and eating them. On one occasion he ate nothing else for a whole day. He found them to have an agreeable nutty flavor, and especially recommended them deprived of their legs and wing cases, and fried in butter, and also spoke very highly of a soup made from them. He referred to John the Baptist, who had often been pitied for the scantiness of his fare, locusts and wild honey; Mr. Riley thought he had been well provided for. The writer regarded it as absurd that parties should actually die of starvation, as some had done in the districts where this locust plague had prevailed, while surrounded by such an abundance of nutritious and palatable food.

The meeting then adjourned, subject to the call of the President.

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On Tuesday evening, the Cambridge Entomological Club held a meeting, when all interested in Entomology were invited to be present. W. Saunders, of London, Ont., was called to the chair. After the usual routine business had been disposed of, Mr. George Dimmock read a paper on the recent excursion of the Cambridge Club to the White Mountains, where the members had spent some two weeks in collecting. The experiences related were of a very interesting character, showing that the party, besides accomplishing much useful work, had thoroughly enjoyed their trip. Mr. Austin, who had been one of the party, exhibited a large collection of insects made during the past two years among the White Mountains, embracing many very interesting species, and offered some remarks on their habits.

Messrs. Cook, Lintner, Morris and Riley were elected members of the Club.

Mr. Grote presented some instructive facts in relation to the identity of some of the White Mountain moths with those of Labrador. Mr. Riley enquired whether many *Caloptenus* had been found on Mount Washington, and expressed the opinion that a race of *spretus* had been found there.

Mr. Saunders enquired of the Michigan friends whether *Pieris rapæ* had been found in the State. Prof. Cook stated that it had not yet appeared in Michigan; he remarked that *protodice* was much more numerous than *oleracea*. Mr. Riley stated that *protodice* was most abundant throughout Illinois and Missouri. Mr. Ison, of Cleveland, stated that *rapæ* appeared in his neighborhood for the first time last spring; at first it was found along the lake shore, but before the season closed it was abundant throughout the greater part of the district over which his observation had extended. Mr. Ison said that with them the larva seemed to prefer mignonette to cabbage. In reply to a question as to the correctness of the views advanced by some Entomologists in regard to the color of the imago being affected by this food plant, Mr. Lintner said that he had, from among 500 or 600 specimens fed on cabbage, found a number of the yellow variety. Mr. Riley stated that the larva of *protodice* was also partial to mignonette.

*Danais archippus* formed the next topic of discussion. Mr. Cook had found the larva this season peculiarly infested by several parasites. Mr. Riley had seen Tachina flies bred from *archippus*. Mr. Saunders had reared, on one occasion, a large number of small Hymenopterous parasites from a chrysalis. He also asked the members if any explanation could be given of the reason why this species assembled occasionally in immense swarms and migrated thus from place to place, and referred to instances of such swarming. Mr. Ison referred to an immense swarm which passed over Cleveland three years ago. In this instance it appeared as if they had crossed the lake from Canada; they were seen in immense numbers for three or four days. *Archippus* was said to occur in Australia, where it also occasionally swarms.

(To be concluded in our next.)