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The Canadian Entomologist.

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ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

To the Members of the Entomological Society of Ontario:

GENTLEMEN,—Again it is my privilege as your retiring President to address you, to draw your attention to Entomological subjects, and more especially to the operations of the insect world about you and to record the progress or decline of those noiseless disturbers of our peace—injurious insects.

The City of Ottawa being one of the great centres of our lumbering interest, it seems fitting that I should on this occasion call your particular attention to some of those insects most injurious to our pine forests. The losses occasioned by the destructive work of borers in pine trees both before and after they are cut are unfortunately too well known to those interested in the lumber trade, although the sufferers may not be familiar with the life histories of their enemies so as to be able to recognize them in the various stages of their existence. The lumberman suffers from the work of a number of destructive species, nearly all of which inflict their greatest injuries during the larval stage of their existence.

There are three families of beetles in which are included the greater number of our enemies in this department. I allude to the longicorns or long-horned beetles, *Cerambycidae*; the serricorn or saw-horn beetles, *Buprestidae*, and the cylindrical bark beetles, *Scolytidae*. To go over this long series in detail would weary you. A brief sketch of the life history of a single example in each family will serve as representatives of the whole.

One of the most destructive of the species included in the *Cerambycidae* is a large grey beetle with very long horns, known to Entomologists under the name of *Monohammus confusor*, and popularly in this district as

the "Ottawa Cow." Where trees have become diseased from any cause, or where a fire has ravaged a pine forest and scorched and partially destroyed the timber, or where logs after being cut have been allowed to remain a season in the woods or in the mill yard—there these insects gather and soon multiply to a prodigious extent. The mature insect is over an inch in length; the antennæ of the male reaches the extraordinary length of from two to three inches, while those of the female are shorter. The female lays her eggs in the crevices of the bark, where the larvæ when hatched eat their way into the wood, burrowing extensive galleries through the solid timber; when mature they are large, white, almost cylindrical, footless grubs. They pass their chrysalis stage within their burrows, and the perfect insect on its escape eats its way out through the bark. There are about a dozen species in this family known to be destructive to pine.

Most of the insects belonging to the family *Buprestidæ* may be recognized by their brilliant metallic colors¹; they have very short antennæ which are notched on one side like the teeth of a saw, and are often hidden from view by being bent under the thorax. *Chalcophora liberta* is one of the most destructive to pine trees, and its history is very similar to that of the long-horned beetle just described, but the larva is of a different form, and has the anterior segments or rings of the body very large, reminding one of the appearance of a tadpole. The perfect insect is about three-quarters of an inch long, of a brassy or coppery hue, with the thorax and wing-covers deeply furrowed by irregular longitudinal depressions. Dr. Fitch enumerates twelve species belonging to this family which are known to be injurious to pine. Additional information in reference to these beetles may be found in an article contained in the last annual report of our Society, by Mr. J. Fletcher, of Ottawa.

The cylindrical bark beetles, *Scolytidæ*, are also a numerous family, eight species of which are known to attack pine. The boring *Hylurgus*, *Hylurgus terebrans*, is probably one of the commonest. This beetle is about a quarter of an inch long, of a chestnut red color, thinly clothed with yellowish hairs, and is found during the month of May. The larva, which is a small yellowish white footless grub, bores winding passages in every direction in the inner layers of the bark of the tree, and also through the outer surface of the wood.

In some parts of our Province pines are greatly injured and sometimes killed by the attacks of a woolly bark louse, which covers parts of the

trunk and branches with a white cottony secretion, under the protection of which myriads of tiny lice live, puncturing the bark with their sharp beaks and exhausting the trees by feeding upon the sap.

While we are mainly interested in the preservation of our mature forests, the future of our country demands that we shall not overlook the young growth on which the lumber supply fifty or a hundred years hence must largely depend, and which it should be the policy of our rulers to protect as far as possible. Most of the governments of Europe are now fully alive to the importance of this matter, and are annually spending large sums of money in establishing young forests. Two years ago I called your attention to an insect then recently discovered by Prof. A. R. Grote, of Buffalo, which was greatly injuring the terminal shoots of both the white and red pines in Western New York; it was the larva of a small moth, *Nephotyxa Zimmermani*, which fed under the bark, causing a free exudation of resinous matter from the wounds it made, followed usually by the death of the twigs infested. Since then it has been found over a much wider area than was at first anticipated, and I have no doubt but that it is to-day materially retarding the growth of young pine trees in many portions of our Province.

At the recent meeting of the Entomological Club of the American Association for the Advancement of Science (where our Society was represented by your President and Vice-President), Mr. S. H. Scudder, of Boston, submitted some observations on another lepidopterous insect which is injuring the young pines growing on the Island of Nantucket. It is a species of *Retinia* closely allied to *Retinia duplana* of Europe. The moth lays her eggs near the tips of the twigs, down which the young larvae burrow, killing them outright, and thus stunting and almost destroying the trees. Prof. Comstock, of Washington, also referred to two other species of *Retinia* which he had observed injuring the pine trees in that city.

In addition to all these there are a score or two of species of insects which are known to devour the leaves of the pines, damaging them in some instances very much. From the facts enumerated it is evident that we are suffering serious loss in all our lumbering districts from the silent workings of these insidious foes, and since in some measure to be forewarned is to be fore-armed, I desire to call the special attention of those immediately concerned in the prosperity, present and future, of the lumbering interests of our country, to this important subject. Unfortunately it does not as yet seem to be within the power of man to do much directly

towards restricting the operations of these enemies to our forests ; yet this should not deter us from studying their habits and history, since an intimate acquaintance with these may result much more to our advantage than we now anticipate. A few trees, such as a belt, or a group planted for shelter or ornament, may be protected from the leaf and twig destroyers by syringing with a mixture of Paris Green and water in the proportion of a teaspoonful to a pail of water, and the bark lice may be killed by the use of alkaline washes applied with a brush or broom, and a timely application of the same will prevent the operations of the borers ; but it is scarcely possible that such remedies can ever be applied over extended areas of forest. It is, however, gratifying to know that in addition to the numbers devoured by our insectivorous birds, that almost every injurious species is in turn attacked to a greater or less extent by insect parasites of the most active habits, who seek out and destroy these pests with ceaseless diligence ; were it not for these friendly insects the destructive species would be far more numerous individually than they now are.

The question as to how best to check the increase of destructive insects is of the greatest practical importance, and probably no insecticide has of late played so important a part in this connection as Paris Green, which is a compound of arsenic and copper, comparatively insoluble and a substance which seems admirably qualified for the destruction of insect life. Besides its special use as a potato-beetle killer, it can be successfully used to destroy any and every insect which eats the leaves of plants, shrubs or trees. So poisonous an agent should be handled with caution if accidents are to be prevented, and it is a matter of great regret that in consequence of carelessness in its use the lives of many valuable animals have been sacrificed, and occasionally even human lives have been imperilled or lost. From the ease with which it can be procured it has also been resorted to in several instances by those determined on suicide. These unfortunate occurrences are greatly to be deplored, and every possible precaution should be taken to avoid accidents. It is quite a common occurrence for painters, hardware dealers and general merchants to sell Paris Green and to send it out without label of any sort, and sometimes the parcel is very insecurely put up and packed with groceries and other articles for home use in the most indifferent manner. Such recklessness should not be permitted and no one should be allowed to sell any substance so dangerous unless it is properly labelled with the name of the article and the word "Poison" prominently attached ; with such precau-

tions generally adopted many accidents which now occur would be prevented. It has been urged by some that so many evils have attended the use of Paris Green that it does more harm than good, and that its use should be discontinued; but in this I am not prepared to concur, as I am satisfied that without it, unless some suitable substitute were found, the potato crop in many localities could not be preserved from destruction. If reasonable care is exercised and the powder be used mixed with water, there is no danger attending it, and its use in this manner in the proportion already mentioned of a teaspoonful to a pail of water and applied with a whisk, is not only safe but most economical.

For some years past experiments have been made with various other substances with the view of finding a substitute for Paris Green which would be less dangerous in the hands of the careless, and among them I believe none have been used with greater success than common blue vitriol or sulphate of copper, in solution in the proportion of about an ounce to a pail of water, and applied in the same manner as the Paris Green mixture. This article is worthy of, and will doubtless receive, a more extended trial, as its use under any circumstances would be attended with but little danger. For the destruction of household pests Insect Powder has lately attracted much attention, and is probably the most valuable agent we have for this purpose, and it is quite harmless to man and the higher animals. There are two sorts of this powder, known in commerce under the respective names of Persian and Dalmatian Insect Powder; the former is the powdered flowers of *Pyrethrum roseum*, the latter of *Pyrethrum cinerariæ-folium*. The Dalmatian Powder is most highly esteemed. The powder is diffused through the atmosphere by means of a small bellows, or insect gun, and in a very short time it brings house-flies, cockroaches, etc., on their backs, and dusted among bed-clothing is equally effectual on noxious pests there. It does not at first kill the insects outright, but paralyzes them so that they are unable to use either legs or wings, and after remaining in this condition many hours and sometimes days, a solitary individual here and there will either wholly or partially recover, but the great bulk of them die.

A very active blue-bottle fly placed under the influence of the powder was brought on its back in one and a half minutes. After six minutes it performed some remarkable evolutions, throwing itself about in the most desperate manner by the aid of its wings, for by this time it had lost the use of its legs; in a few moments more it was quiet, but still able to move

its legs, and this power it retained for two days, after which it was lost sight of. The same powder was applied to a full-grown grasshopper; immediate uneasiness was manifested, and within two minutes its hind legs were partially paralyzed so that they could not be used with much effect. The first symptoms were a general rubbing of the legs against each other and a peculiar backward movement of the body; in four minutes there was a trembling of the whole frame, while all the legs were so much affected that locomotion was very feeble. In six minutes the insect had lost all control over its limbs, and in nine minutes it was on its back with no power to recover its natural position. A second patient manifested precisely similar symptoms, but was not affected quite so rapidly. Applied to house-flies in a room, some of them begin to fall powerless in two or three minutes; others will remain active several minutes longer, but manifest constant uneasiness, evidenced in unnatural movements of wings and legs, and a frequent thrusting out of the proboscis. Having operated in a room one day about noon, I swept up after a few minutes several hundred flies and put part of them in a tumbler covered with a small plate, and the remainder in a chlp box which I carried in my pocket for the first day, where the flies would receive some warmth from the body. After five or six hours the box was opened, when several crawled out or flew with a very weak, short flight; these were evidently recovering; the others remained on their backs, many of them moving their legs now and then. At the same time those in the tumbler were looked at; all were on their backs, but still alive. In twenty-four hours afterwards those in the glass were in the same helpless condition, barely alive, while in the box three more had so far recovered as to be able to walk, and one of them could fly a little. The following day they were examined again and every one of those in the box were dead, while in the tumbler out of 137 there were 22 alive, which number was reduced to three the following day; this small remnant survived two days longer, when all died.

In the use of Insect Powder on the green Aphis which infests house plants, the same course was observed; the insects dropped from the plants as if paralyzed, and after a short time were incapable of locomotion. After two days they were found still alive, but in this instance there was no sign of recovery in any of them, and all died within two or three days afterwards, but whether from the direct effects of the powder or from starvation I was unable to decide.

When I addressed you last year I referred to a strange disease which

had destroyed large numbers of that destructive pest, the Forest Tent Caterpillar, *Clisiocampa sylvatica*. After the disease had reached a certain stage the larvæ remained motionless, retaining their hold on fences and the trunks of trees; shortly, although in appearance they were quite natural, when touched they were found to be dead, and their bodies were so decayed as to burst with a very gentle handling. Subsequent observations convinced me that this was the result of a fungoid disease to which caterpillars, as well as some perfect insects, are very subject. A similar disease sometimes attacks the silk-worm and causes great devastation, and the common house-fly is liable every autumn to die from the effects of a fungus which multiplies with amazing rapidity within the fluids of the fly's body, soon destroys life and forms a circle of luxuriant growth all around its victim. Examples of this may be found on the windows of almost every dwelling during the month of September. Some years ago a learned European professor claimed that he had proved the identity of this fungus with the common blue mould and also with that of yeast; and in proof used the fungus of the fly for the purpose of raising bread, and showed that it was possible to brew beer with the common mould. The close relationship, if not the actual identity, of these three was thus established. Quite recently it has been proposed by Dr. Hagen, of Cambridge, Mass., to use a diluted solution of yeast in water with an atomizer as a means of destroying noxious caterpillars and other insects by introducing disease among them, and it seems quite likely that the use of this remedy may to some extent prove effectual.

The Cabbage Butterfly, *Pieris rapæ*, having pretty well colonized the northern portions of America, is still traveling southward. During the present season it has been reported as common in many localities in the State of Alabama, and has nearly reached the Gulf of Mexico; it seems as capable of adapting itself to extremes of heat as of cold. The Forest Tent Caterpillar, *Clisiocampa sylvatica*, which has been so very numerous and destructive in our neighborhood for two years past, has almost disappeared. The Colorado Potato Beetle seems to have fairly established itself in several places in Europe, and if it proves as prolific there as here it will be rapidly disseminated. The Wheat Midge, *Cecidomyia tritici*, has appeared in the neighborhood of Port Hope, Ont., but not to any alarming extent. The Plum Curculio, *Conotrachelus nenuphar*, has been common as usual, while reports have been received from several districts of the increasing prevalence of the Codling Worm, *Carpocapsa pomonella*.

Our journal, the CANADIAN ENTOMOLOGIST, has been well sustained during the past year, and through the kindness of our esteemed contributors we have been enabled to present our readers with many original papers of great practical value. Mr. W. H. Edwards, of West Virginia, has continued his very useful and valuable papers on the life histories of our butterflies. Dr. Bailey, of Albany, N. Y., has given us an interesting description of the various stages of *Cossus Centerensis*, illustrated by an excellent lithographic plate. Many new species of insects have been described by Messrs. A. R. Grote, W. H. Edwards, V. T. Chambers, Prof. Fernald and others, besides which we have published a very large number of papers of general interest.

Among the more important recent contributions to our Entomological literature may be mentioned a new edition of the Catalogue of the Described Diptera of North America, by Baron Osten Sacken; the Coleoptera of Florida and Michigan, by John L. LeConte, M. D., and E. A. Schwarz; Report on the Insect and other Animal Forms of Caledonia Creek, New York, by J. A. Lintner; the Coleoptera of the Alpine Regions of the Rocky Mountains, by John L. LeConte, M. D.; on the Collection of Insects made by Dr. Elliot Coues in Dakota and Montana—the Orthoptera by Cyrus Thomas, Hemiptera by P. R. Uhler, Lepidoptera by W. H. Edwards; Notice of the Butterflies Collected by Dr. Edward Palmer in Southern Utah and Northern Arizona, in 1877, by Samuel H. Scudder; and an account of some insects of unusual interest from the Tertiary Rocks of Colorado and Wyoming, by the same distinguished author. The elaborate and voluminous report of the U. S. Entomological Commission on the Rocky Mountain Locust, with maps and illustrations, issued in 1878, did not reach us in time to be noticed at our last annual meeting. It is a work which has involved great labor, and besides containing much that is new, covers the entire field of our knowledge in reference to this destructive pest. Prof. C. V. Riley, of Washington, has issued a special report on the Silk-worm, being a brief manual of instructions for the production of silk, with illustrations. Prof. A. R. Grote has written Preliminary Studies on the North American Pyralidæ, and Samuel H. Scudder a Century of Orthoptera. Several additional numbers of Edwards' magnificent work on North American Butterflies have appeared, with charming plates.

The members of the Entomological Commission of the United States are devoting their attention this year especially to the Hessian Fly, inves-

tigating its habits, preparing statistics of the losses occasioned by its attacks, and testing the various remedies which have been suggested for its destruction. In a circular issued in June last they solicit the co-operation of Entomologists, many of whom will, I trust, be able to render them efficient aid in this good work.

During the year death has removed from our ranks three well known laborers in the Entomological field, Dr. Asa Fitch, late State Entomologist of New York; Dr. Hermann Loew, the eminent German Dipterist, who has done so much to advance our knowledge of American Diptera; and Frederick Smith, the renowned English Hymenopterist. Thus year by year we are called to mourn the loss of those whose names, for their works' sake, we revere. They have gone to their reward; we live to labor. Let us each endeavor to make the best possible use of the time and opportunities we have, however limited they may be, and diligently and contentedly labor in the sphere in which God has placed us; prompted by pure motives, may we with earnest effort probe deep into the secrets of nature, and draw from thence treasures new, so that when we pass away we may leave behind us some little lustre which may lend a light, however dim, to those who will fill our places.

I have the honor to be very sincerely yours,

WM. SAUNDERS.

ON THE PREPARATORY STAGES OF CERTAIN FLORIDA BUTTERFLIES.

Editor Canadian Entomologist:

I have received from Dr. A. W. Chapman, of Apalachicola, descriptions of preparatory stages of several species of Florida butterflies, made by him 1870-1872, with permission to publish such as I saw fit. I send one instalment confined to the Hesperidæ, and where it seemed desirable I have added notes of my own in brackets. Except in case of *Eudamus Proteus*, wherever Dr. Chapman has described larvæ which are also figured by Abbot, in Smith-Abbot, Insects of Georgia, or by Boisduval and LeConte, after drawings of Abbot, the description differs essentially from the

figure, and I am the more confirmed in the opinion which I have for some time entertained, that much of Abbot's work in this direction is unreliable.

W. H. EDWARDS.

1. PAMPHILA PHYLEUS, Drury.

MATURE LARVA—Length .7 inch ; fusiform ; of a uniform dull green, and thickly granulated with pale points ; collar on second segment dark brown ; head small, smooth but punctulate, dark brown.

CHRYSLIS—Length .5 inch ; nearly cylindrical ; the head, thorax and abdomen pubescent ; color pale green ; a black line, interrupted on the posterior segments, extends from back of head case to last segment ; a lateral black streak on the thorax and a lateral row of black spots on the abdomen ; more or less punctured throughout ; the wing cases paler, contracted behind into a subulate point ; anal hook stout, spine-like. The imago emerged 2nd July. The larva fed on grass.

(In Bois. and Lec., this larva is represented as pale green, with two broad longitudinal sub-dorsal darker green bands, and a stripe above the feet. The chrysalis accompanying is green with no apparent marks except a row of reddish points on side of abdomen.)

2. PAMPHILA BRETUS, Bois. and Lec.

EGG—White, smooth, hemispherical ; laid on Paspalum setaceum (grass) July 4th ; hatched 10th July.

YOUNG LARVA—White with large black head, and black collar. On 21st July one-half inch long ; color greenish-white. Aug. 3rd, 1 inch ; fusiform ; pale green with a dark dorsal stripe and an obscure line on either side ; collar black, and separated from it on either side a black dot ; spiracles black ; head rounded, projecting obliquely, granulated with black, the sides of face and two streaks on upper face yellow-white. Made chrysalis Aug. 5th.

CHRYSLIS—.75 inch ; color pale green, the abdomen whitish ; wing cases smooth, faintly veined ; the antennæ cases extending in a filiform point to the end of the abdomen ; on either side of head case a dark point, and a row of dark points along side of abdomen. Imago emerged 14th August.

The larva forms a tube with the leaves in which it lies concealed during the day, feeding mostly at night.

3. PAMPHILA ACCIUS, Smith-Abbot.

MATURE LARVA—Length 1.33 inch ; slender ; nearly white, but under the lens mottled and dotted with darker lines and points, the rings on the posterior half of each segment more prominent and less dotted ; collar black ; head rather small, oblique, oval, flattened frontally, white with a black band around top and sides, a black streak down middle of face and a short black streak on either side of this last, and not reaching the band at top.

CHRYsalis—Slender, smooth, white ; the head case tapering into a slender pointed beak.

The larva was found 2nd Aug., wrapped in the leaves of *Erianthus alopecuroides* (a grass).

(Abbot figures this larva as nearly white, with five distinct greenish longitudinal bands extending from head to last segments, and without collar ; the head striped with reddish. He gives the food plant as *Glycine frutescens*.)

4. PAMPHILA MACULATA, Edw.

MATURE LARVA—Length 1 inch ; slender, pale green, finely pubescent ; the last two segments deeper green ; collar light brown ; head oval, oblique, densely pubescent, slightly granulated, light brown.

CHRYsalis—Length .8 inch ; cylindrical, dull green ; pubescent, especially about both extremities ; the head case blunt, wing cases smooth ; on 8, 9 and 10 are two flat tubercles on ventral side ; the anal hook broad, triangular. (Food plant not given.)

5. PAMPHILA ARPA, Bois. and Lec.

MATURE LARVA—Length nearly 2 inches ; pale green striped with yellow, the segments after 2 thickly lined with fine streaks of green and yellow ; collar black edged before by yellow ; spiracles black ; head high, narrow, blackish, bordered around top and sides by white, and with two white incurved (concave to each other) streaks on upper third of face ; these separated by velvety black.

CHRYsalis—Length 1.2 inch, nearly cylindrical, light brown, covered with a white powder ; the abdominal segments pubescent ; the wing cases prolonged into a short subulate point ; the abdomen long, tapering slightly, and the end bluntly rounded. The butterfly emerged 21st Aug.

The larva feeds on saw palmetto, forming a tube of the bases of the fan-like segments of the leaves, in which it lies concealed and in which it changes.

(Bois. and Lec. figure the larva and chrysalis, after Abbot. The larva is shown as pale green with a macular darker sub-dorsal stripe, and a double band on side. The head is almost spherical, yellow, edged with red, and with a red curved stripe on face. The chrysalis is much smaller than Dr. Chapman represents, and as he gives a pencil drawing of it, I see that it is of quite different shape from Abbot's, which has a short abdomen, tapering nearly to a point.)

6. PAMPHILA PALATKA, Edw.

MATURE LARVA—Length 2 inches; cylindrical; collar a black line connecting two black lateral dots; anal plate semi-circular, projecting; color of body yellowish-green, thickly dotted with minute, dark, hair-tipped tubercles; spiracles black; under side bluish; head obliquely projecting, brownish, the upper part of the face white and marked by three black stripes. Feeds on saw grass (*Cladium effusum*), drawing the faces of the strongly keeled leaves together, and in the tube thus formed lying concealed when not feeding. (Chrysalis not described.)

(I believe this species is either same as *Bulenta*, or at most but a variety of that. The larva and chrysalis of *Bulenta* are figured in Bois. and Lec., after Abbot, and both are scarcely to be distinguished from his figures of corresponding stages of *Arpa*. In the former the sub-dorsal band is continuous, instead of macular, and in the latter the lateral bands are mostly obsolete. There is thus no agreement with Dr. Chapman's description of *Palatka*, in which the whole upper side is yellow-green, without lines or bands.)

7. PAMPHILA DELAWARE, Edw.

MATURE LARVA—Length 1 inch; fusiform; color bluish-white; collar black, ending in a black dot on either side; a lunate black band on 13 and anal plate; the surface thickly dotted with minute black tubercles; head oval, oblique, white, smooth, slightly bilobed; a black band about top and sides, a black vertical streak on middle face and a short streak of same color on either side this last.

CHRYSALIS—Narrow, greenish-white; the head case blunt, black, tubercled and bristly; the last segment black. The larva was found

wrapped in a leaf of *Erianthus alopecuroides*. The imago emerged 30th August.

8. *EUDAMUS PROTEUS*, Linn.

MATURE LARVA—Length 1.5 inch; fusiform; a fine dark dorsal line, a bright yellow sub-dorsal band which is dilated on the 12th segment, and a pale green line along base of body; the dorsal space between the bands gray dotted with black and yellowish arranged in transverse lines; the sides gray, with the upper half dotted with black; collar lustrous black; anal plate yellow, greenish in middle; under side pale green; legs black, pro-legs yellow; head large, round, brown, pubescent, slightly depressed at top; a yellow spot on each side of the mouth narrowing upwards and fading into the light brown of upper part of face.

CHRYSLIS—Covered with a white powder. The larva feeds on Leguminosæ, on *Phaseolus perrennis* and *Cliteria Mariana*.

(Abbot's figure of this larva agrees with the above description, but the figure given in Bois. and Lec., after Abbot, has scarlet patches about head and body not found in the larva, and is otherwise an incorrect as well as coarse copy of Abbot.)

ON THE EARLY STAGES OF SOME GEOMETRIDS.

BY L. W. GOODEL, AMHERST, MASS.

Tetraxis crocallata Guen.

Mature larva, one specimen—Head brown, much narrower than the body; two large dark brown spots in front. Body stout and very slightly attenuated anteriorly, the 1st and 2nd rings much narrower than the rest and retractile into the 3rd. About a dozen minute black tubercles on each ring. Reddish brown covered with numerous, wavy hair lines; paler beneath with a large dirty brown patch enclosing two light brown spots on the 6th and 7th rings. Length when at rest 23 mil.; when crawling 28 mil. Feeds on the Chestnut. Became a pupa July 15th, within leaves drawn together with a few threads.

Pupa—Length 17 mil.; ashen gray, tinged with reddish and speckled with brown; a brown dorsal stripe, obsolete on the abdominal segments.

Thorax paler with a small dorsal brown spot. Head brown with a vertical red streak. Abdomen dark brown beneath speckled with reddish, the anal segments with a transverse dark brown dash above. Wings pearly ash with a submarginal row of seven brown spots. Caudal spine round with two long hooked forks; four slender bristles at the base, two above and two beneath, very much hooked at the tips.

Therina endropiaria Pack.

Mature larva, one specimen—Head wider than the first segment of the body, roundish and greenish gray, brown on the sides. Body rather slender and attenuated anteriorly; color a mixture of brown and greenish gray; a small angular tubercle on the side of each of the 2nd, 5th and 6th rings, and a dorsal pair of the same on the 6th, 8th and 7th, those on the 8th smaller than the others. Length when at rest 32 mil.; when crawling 36 mil. Feeds on the Oak, Pupated Sept. 4th, just beneath the surface. Moth emerged May 19th.

Acidalia enucleata Guen.

Mature larva, one specimen—Head not so wide as the body, gray with a vertical brown streak on each side. Body slender and attenuated anteriorly, pale brown streaked and variegated with darker brown. Length when at rest 41 mil.; when crawling 46 mil. Feeds on the Blueberry (*Vaccinium*). Changed to a pupa in a thin cocoon on the surface, June 29th.

MEETING OF THE ENTOMOLOGICAL CLUB OF THE
AMERICAN ASSOCIATION FOR THE ADVANCE-
MENT OF SCIENCE.

(Continued from Page 177.)

Prof. Fernald stated that he had received from Oregon and Washington Territory specimens of *Retinia duplana* and *sylvostrana* identical with the European forms, and further referred to the fact that in America the species of Tortricidæ are more abundant in the West than in the East.

Mr. Grote called the attention of the members to the ravages of *Nephtopteryx Zimmermani*, which he believed had inflicted more injury on young pines than any other insect; it is found throughout the northern and north-western parts of New York State. Mr. Grote laid particular stress on the fact that the European pines imported and sold by nursery-men are much infested, and desired to call public attention to this matter. With regard to the use of Paris Green as an insecticide, he thought that it was doubtful whether the injury caused by it was not greater than would occur from the Potato Beetle were it allowed to go unmolested; and instanced the loss of a stallion valued at \$2,500, poisoned by Paris Green, and also referred to the frequent injuries to animals and man reported in the newspapers. This opinion was opposed by other members present, who stated that but for the use of Paris Green or some such poison, it would be impossible in some sections of the country to grow potatoes at all.

Prof. Fernald referred to a Tortrix found in Maine, *Tortrix nigridia*, which had very much injured the pines there; he had collected a large number of the larvæ and chrysalids of this insect, and from them, besides the moths, had obtained many ichneumon parasites and also several hair snakes. Prof. Fernald embraced this opportunity of calling the attention of the members to the condition in which he had found the types of the North American Tortricidæ. Many of them were being destroyed by the verdigris formed by the corrosion of the pins on which they were mounted, and in some instances this verdigris has accumulated to such an extent as to burst the bodies of the insects. To avoid this difficulty he has used japanned pins, and found that when thus coated they remained free from corrosion.

Mr. Grote remarked that *Scoliopteryx libatrix* was very widely distributed in this country as well as in Europe, being found here from Hudson's Bay to the Southern States. He also referred to Mr. Grey's discovery that *Limenitis arthemis*, *disippus*, *ursula* and *proserpina* are connected by intermediate individuals, and that this indicated that they had not long been separated from a common stock, and expressed the opinion that *arthemis* was probably nearest the original form.

Mr. Scudder, referring to the same subject, regarded *disippus* as probably the original type of this species.

Mr. Lintner held that it was premature to conclude that the different

species of *Limenitis* are identical until it could be proven positively by rearing the one supposed species from the eggs of the other.

Mr. Scudder exhibited a piece of a woody root which was represented as coming from the interglacial beds of clay near Toronto, Ontario. This root proves by microscopic examination to belong to a species of Juniper and is bored by an insect, probably a *Scolytus*, but one which differs materially in its habits from any known species now existing. Mr. Scudder also referred to the abundance of insect remains which he had found in the peat deposits on the Island of Nantucket; from one mass of about a cubic foot he had obtained 300 fragments of Coleoptera, among which were several which he had been unable to refer to any species now known to exist; a number of these specimens were shown to the members.

Mr. Austin exhibited specimens of a wasp, *Polistes metrica* Say, infested with parasites.

On motion the meeting was adjourned until 8 p. m.

EVENING SESSION.

Prof. Comstock exhibited specimens of a small Pyralid which is carnivorous, feeding in the larval state on the maple tree bark-lice, under the cottony matter secreted by the lice. He had bred forty of the moths fed in this way.

Mr. Scudder drew attention to a very singular fossil, of which he had obtained about 100 specimens, somewhat resembling the larva of an insect, but yet quite different from anything hitherto known. His remarks were illustrated by a figure of the object. It consists of only six segments.

Mr. Barnard exhibited specimens of *Phymata erosa*, which has proved quite destructive to other insects; they have been known to destroy quite a number of *Pieris rapae*. Mr. Barnard exhibited a number of specimens which had been caught on the burrs of the Burdock.

Prof. Riley stated that *Pieris rapae* was now quite common in Alabama; it had been seen as far as Selma, but had not yet reached Mobile. Mr. Scudder remarked that it had been found in Savannah, Ga., two years ago.

Prof. Comstock had received specimens of the Colorado Potato Beetle this year from Manitoba, and thought that this was the farthest point north it has yet reached.

Mr. Saunders made some remarks in reference to the capture of insects by the flowers of a species of *Bidens*, probably *chrysanthemoides*; the

insects which he had observed thus captured were Dipterous, all of whom had been caught by the mouth ; some were found dead, others still living, but unable to withdraw their proboscis.

(To be Continued.)

NEW NOCTUIDS.

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

Tamila velaris, n. s.

Thorax clothed with mixed scales and hairs. Middle and hind tibiae armed. Fore tibiae with a row of spines on each side, four in number, increasing in size to the end of the joint. Front full, thickly clothed with mossy scales. White ; with ochre shading. Fore wings with a wide arcuate sub-basal ochre band ; a more diffuse band of similar shape crosses the middle of the wing ; beyond this the reniform spot, ferruginous, incomplete, with a prominent outer dot. Posterior line diffuse, interrupted. Subterminal space narrow, shaded with ochrey. Terminal space showing a white triangle before apices and again white below vein 4 ; an ochre stain from apices to vein 4. Hind wings stained with yellowish. Beneath yellowish dusky with a subterminal, shaded dusky fascia on primaries. *Expanse* 23 mil. *Hab.* "Caliente, California," Hy. Edwards, Esq., No. 7, 173.

This species resembles *nurdina* rather than *Meadii*. A single specimen, possibly faded.

Tamila vanella, n. s.

♂. Thorax clothed with mingled scales and hair. Tibiae armed ; eyes naked. A small dark species recalling *tertia* in the ornamentation of primaries. Primaries dark blackish brown with the median space ochrey whitish. Orbicular absent ; reniform large, brownish ; below it descends the dusky median shade near to the outer line. Costa on median space brown. Inner line white, lined within by black, narrow, upright, twice indented, forming three scallops. Subterminal line a series of pale, black ringed dots. Fringes blackish, interrupted with brown. Hind wings black with a sub-basal white fascia spreading on costa ; beyond, a discal white dot ; fringes whitish. Beneath distinctly marked, shaded with reddish on costal regions ; median fields white, with large black

discal marks. Both wings black at base; subterminal black bands, spreading to anal angle on secondaries. Body beneath pale olivaceous. Thorax olivaceous shaded with brown. *Expanse* 17 mil. *Habitat* Nevada, Mr. E. L. Graef. The single specimen is fresh, but the fore legs are broken off. The outer line on primaries is white, indistinctly margined, even, slightly exerted, nearly upright.

Lygranthoecia separata, n. s.

♀. Allied to *marginata*, *Thoreaui* and *saturata*. Fore wings ochrey purplish with a white cast. Lines regular, white, the inner lined with dusky on the inside, the outer dusky margined on the outside. The inner line greatly medially exerted, the angle obtuse. The outer line subflexuous, outwardly bent opposite the disc, where it nearly touches subterminal line. Subterminal space darker than the rest of the wing, narrow; s. t. line white, indented slightly opposite cell and before anal angle. A black discal blotch; fringes pale. Hind wings whitish with terminal interrupted black band and heavy black discal spot. Beneath pale with subterminal shades, two black discal marks on primaries, one on secondaries. *Expanse* 28 mil. *Habitat* Nevada, E. L. Graef.

Tarache lanceolata, n. s.

By its narrow and long primaries allied to *angustipennis*; differing by the white secondaries shaded with dusky before the fringes and the color of primaries. These are white along costa to subterminal line and below the middle of the wing deep olive green; the green color twice cutting the costal stripe at the anterior and posterior lines, which are vaguely defined. Below apices are two superimposed black longitudinal dashes very narrowly edged with white; below them a white diffuse shade widens to internal angle. The discal marks are evident, round, olive colored, the orbicular small. Fringe dusky, twice splashed with white. This form much resembles *angustipennis*; the apical ornamentation seems to differ strongly, as in the latter species the black dashes (reminding us of *Cerintia*) are totally wanting. One fresh specimen, Belfrage, Texas, May 6, No. 744, red label. *Expanse* 24 mil. The dark thorax is shaded in front with white as in *angustipennis*.

Eustrotia retis, n. s.

Allied to *apicosa* (*nigritula*) and closely resembling that species. A little larger with darker secondaries. Primaries blackish with the anterior

line much as in *apicosa*; discal spots smaller than in its ally; posterior line straighter, without the prominent inward curve below the reniform, neither followed by a carneous shade at this place as in *apicosa*. The posterior line is followed by two fine ochrey shade lines; beyond these the subterminal space is blackish, cut by pale scales on the veins. Subterminal line fine, pale, irregular. Terminal space dusky, no apical spot; terminal margin more angulated than in *apicosa*, being produced opposite veins 3 and 4; the difference in shape of wing is quite marked. Terminal line black, interrupted, preceded by a fine edging of pale scales. Beneath much as in its ally, the discal dot on secondaries larger. *Expanse* 28 mil.; Penn., Mr. W. H. Stultz; one male specimen.

Eustrotia secta, n. s.

A small species with the ornamentation of primaries recalling *synochitis*. Hind wings dark fuscous with paler fringes. Fore wings shaded with whitish gray at base; median space brown below the median vein and here shaded with black, so that here a darker internal patch is formed, reminding one of the green patch in *synochitis*. Orbicular wanting; reniform two superimposed black points. Subterminal line diffuse, perpendicular, twice outwardly exerted, brownish. A dotted ferruginous terminal line; fringes fuscous gray, interlined. Three black ante-apical costal dots, preceded by pale points. Lines indistinct, anterior outwardly arcuate. *Expanse* 18 mil. *Hab.* Massachusetts, Mr. Roland Thaxter, No. 16.

Oncocnemis aterrima, n. s.

Fore wings dead black with obliterate ornamentation. The small reniform may be distinguished ringed with white. The inner line is lost; outer line white, evenly curved opposite the cell, slightly bent inwardly below median vein. The subterminal space is washed with white behind the outer line and this portion of the wing is the most prominently ornamented. A series of whitish points indicates the subterminal line. There is a slight olivaceous powdering over the primaries and thorax. Hind wings dead black, with a median curved dark line brought into relief by a following pale shading; fringes whitish. Beneath black with a common median line followed by white streaks and shading. Eyes naked; fore tibiae with a stout claw. *Expanse* 22 mil. *Habitat*, Havilah, Cal., Mr. Hy. Edwards, No. 119. This species has a slight Heliothid appearance and differs much in markings from the others known to me in this genus.

CORRESPONDENCE.

DEAR SIR,—

The following note may prove of interest as showing the numbers in which the larvæ of *Lachnosterna fusca* may exist in a lawn without perceptible damage to the grass resulting.

On Sunday last, while walking through the Capitol grounds a few hours after a heavy shower of rain, I observed these larvæ in great numbers upon the stone pavement north and east of the Capitol building. I counted up to three hundred and then came to a spot where they were so thick that I had to give it up. I certainly saw *thousands*, nearly all of which were dead, either from heat or from having been trodden upon. Upon interviewing the Superintendent of the grounds, I learned that at this season of the year the grubs always make their appearance in like numbers after a hard rain. This gentleman informed me, and his statement was corroborated by several others, that frequently the sweepers of a morning in going over the walks would collect at the bottom of the hill as many as a *bushel* of the grubs. The pavement is edged on both sides by a two-inch curb, and the larvæ falling over this are unable to return; only those grubs inhabiting the earth near the curb would reach the walk, and the great numbers killed in this way after every shower afford an index to the immense number which the entire lawn must contain. Yet, in spite of this most serious drawback, as one would naturally call it, the grass over the entire plot is so fresh and green as to call for universal admiration.

The movements of the larvæ upon the smooth pavement were very interesting. The characteristic bend of the body unfits them for walking on smooth surfaces, and every live individual that I observed was upon its back, moving forward quite rapidly by the alternate expansion and contraction of the segments. This mode of locomotion seemed strange at first, but upon reflecting that the probable natural position of the larva in the earth is upon its back with its legs grasping the grass roots, it seemed not so unnatural after all. The strong transverse corrugations and rows of bristles upon the dorsum, taken in connection with the extremely business-like and natural air with which the larvæ took this position and the rapid progress which they made while in it, would seem to indicate that the back is used for locomotion with these insects more than has perhaps been suspected.

L. O. HOWARD.

Washington. D. C., Sept. 17.