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The Canadian Entomologist.

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No. 12

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Entomological Society was held in London at the Society's rooms, Victoria Hall, on Tuesday, October 13, 1885, at 8 o'clock p. m.

The President, Mr. Wm. Saunders, of London, Ont., in the chair.

Present—Mr. James Fletcher, Ottawa; Mr. T. Alston Moffat, Hamilton; Rev. C. J. S. Bethune, Port Hope; Mr. W. H. Harrington, Ottawa; Capt. Gamble Geddes, Toronto; Rev. F. W. Fyles, South Quebec; Mr. J. G. Bowles, Montreal; Mr. J. M. Denton, Mr. H. P. Bock, Mr. Lawrence Reed, of London; Messrs. Weld and Macdonald, of the *Farmer's Advocate*, London, and the Secretary-Treasurer, Mr. E. Baynes Reed.

The minutes of the former meeting were read and confirmed.

The President gave a cordial welcome to the visiting members and expressed the pleasure of the London members at meeting so many of their friends.

The Report of the Council, the Financial Report of the Secretary-Treasurer, and the Report of the Librarian for the past year, were then submitted to the meeting, and on motion duly received, discussed and adopted.

These Reports will appear as usual in the Annual Report.

The President stated that owing to unforeseen circumstances no delegate had been sent to the last meeting of the American Association for the Advancement of Science held at Ann Arbor, Michigan, but that a summary of the business transacted by the Entomological Club had been kindly forwarded by the Secretary, and would be published in the CANADIAN ENTOMOLOGIST.

The Report of the Montreal Branch was read, and after an expression of gratification by members present at the prosperous condition of the Branch, the Report was received and ordered to be printed as usual.

REPORT OF DELEGATE TO ROYAL SOCIETY OF CANADA.

Mr. W. H. Harrington presented his Report read at the meeting of the Royal Society, as follows :

As delegate from the Entomological Society of Ontario, it affords me much pleasure to announce that the Society has continued to make satisfactory progress, both in membership and in the work which it undertakes.

The monthly publication of the "Entomologist" brings before students of insects, both in this country and abroad, very valuable and interesting papers on the habits and life-histories of our species, with frequent descriptions of new species discovered in our extensive country. Volume xvi. has been completed, and several valuable parts of xvii. have been already issued.

The "Annual Report," No. xiv., issued by the Society, contains several instructive papers prepared especially for agriculturists, and well supplied with such illustrations as may enable them to recognize the insects therein described.

The Montreal Branch of the Society is in a flourishing condition, which is due to the exertions of the energetic and enthusiastic Entomologists who reside in that city.

Gratification is felt at the evidence of a growing interest in regard to the very important question of the serious losses annually caused throughout the country by the depredations of various insects.

The Select Committee appointed by Parliament in 1884 to obtain information as to the agricultural interests of the Dominion, issued circulars to a large number of leading fruit-growers and other agriculturists throughout the country, requesting, among other points, an expression of opinion as to the desirability of the appointment of a Government Entomologist. A large majority of the answers were in favor of such an appointment.

Two members of the Council of the Entomological Society were also called, and gave evidence before the Committee as to the ravages of insects in Canada, and as to the advantages which would result from the appointment of a competent Entomologist.

The Department of Agriculture, impressed by the importance of the subject as thus brought before its notice, has since appointed as Entomologist one of the most energetic officers and workers of our Society—Mr. James Fletcher—who has issued a Preliminary Report, briefly describing

the most noticeable injuries caused by insects last season to the various crops.

In the United States great attention is still paid to the study of Economic Entomology. Several of the States, as well as the Federal Government, make liberal provisions for the investigations of appointed Entomologists.

The published Reports of such investigations are exceedingly valuable ; and furnish, with the exception of that supplied by the Entomological Society of Ontario, almost the only reliable information regarding the injurious insects infesting our orchards, fields and gardens.

It is a matter of no little importance that as full information as can be obtained should be, as widely as possible, circulated among our farmers, and to this end the appointment of an Entomologist by the Department of Agriculture is an important step in the right direction.

The President then delivered his annual address.

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

Gentlemen,—The season of 1885 has not been distinguished by any unusual invasion by injurious insect hosts. Nothing assuming the proportion of a general or serious calamity in this direction has occurred in any department of agriculture or horticulture ; nevertheless instances have not been wanting where local injuries caused by insects have assumed considerable proportions, the sum total of which, if the results were expressed in money loss, would represent a very large sum.

The great staple productions of our country, such as wheat, oats, barley and hay, have not, so far as we have been able to learn, suffered material injury from insects in any locality in our Province, but while the farmers of Ontario have thus been exempt, our neighbors across the lines have not enjoyed the same immunity. In the neighbouring State of New York the loss occasioned by the Hessian Fly has been estimated at over \$100,000. In the great wheat fields on the Pacific slope, and also in those of Dacotah and other Western States, there have been much severer losses from the same cause. Early in August I received from a correspondent in Dallas, Oregon, samples of wheat seriously injured by another destructive insect which as yet, happily, has not to our knowledge occurred in Canada. This is a small yellowish worm from one-sixth to one-fifth of an inch in length, which is found within the stalk of wheat about

or between the joints ; sometimes there are four or five larvæ in a single stalk, one above each joint for the first four or five joints from the ground, which cause the stalk to prematurely ripen or to wither, and thus occasion great loss. This insect, which is known as the "Wheat Isosoma," *Isosoma tritici*, Riley, has been observed for two or three years past, injuring the wheat in Illinois, Tennessee and Missouri, and has prevailed in some localities to such an extent as to ruin the crop. From the observations thus far made it seems that there is only one brood of this insect during the season, and that it passes the winter in the straw either in the larval or pupal state, the perfect flies appearing the following spring. Under these conditions the remedy is obvious, viz., burn both the stubble and the straw after harvest ; rotation of crops has also been found beneficial.

The cabbage crop has been materially injured by the ravages of the cabbage Anthomyia, *Anthomyia brassicæ*, a two-winged fly which in the larval state burrows in the stem of the young plant and causes its death. This cabbage insect is a native of Europe, is very troublesome in Britain and has been known as a destructive insect in this country for about thirty years, but nothing is known either of the date or the method of its introduction. The flies appear in the spring and deposit their eggs upon the stems of the young cabbages, about or a little below the surface of the ground. The eggs hatch in about ten days, when the young larvæ usually bore into the interior and work their way down towards the root; sometimes they merely gnaw grooves on the outer surface of the stem, and by this means find their way to the roots on which they feed. When full grown they change to yellowish red chrysalids in the earth, from which the flies shortly escape, the whole period of their life history thus briefly traced occupying about eight weeks. Usually the plants attacked soon wilt and finally die. It is believed that there are two or three broods of these insects during the year.

Several remedies have been recommended, such as dipping the roots and stems of the young plants in strong lye, or a mixture of earth and cowdung diluted with water, or a thick mixture of soot and water. Any bitter or alkaline substance which would adhere well to the outer surface would probably deter the flies from depositing their eggs. Lime added to the soil in the proportion of 100 to 150 bushels to the acre, after ploughing, and well harrowed in so as to keep it near the surface, has proved a very effectual preventive measure, or even where the insects are

at work on the plants, if the earth is scraped away from about the stem of each and a handful of lime dusted around it and the soil again drawn up to the stem, the plants will sometimes recover. Coal-dust, gas-lime and stimulating artificial manures have also been recommended.

The cabbage has also suffered from injuries caused by the common cabbage worm, the green caterpillar of the cabbage butterfly which feeds upon the foliage, and often disfigures it to such an extent as to render it unmarketable. The habit of this caterpillar, feeding as it does among the folds of the leaves, makes it extremely difficult to reach with any sort of poison without at the same time rendering the cabbage unfit for use. Pyrethrum or insect powder, which is the powdered flowers of *Pyrethrum cinnerariaefolium*, has been used with good effect, either dusted on the plants, or mixed with water and applied to them with a syringe, and this remedy is not in any way objectionable or poisonous. The Pyrethrum plant is in my experience quite hardy in Ontario, has stood the severe cold of the past two winters without injury, and flowered freely. It is easily raised from seed, and being a perennial species, when once established it will continue to flower for an indefinite number of years. The flowers, collected when just about to expand, dried and powdered, are very efficient as a general insecticide.

During the past year or two many interesting experiments have been made and valuable results obtained, in the way of artificially introducing disease among communities of caterpillars, a sort of caterpillar plague or pestilence which carries them off by thousands. There is a very fatal disease which appears from time to time among silk worms, the larvæ of *Bombyx mori* when bred for the production of silk, a disease which spreads so rapidly that it frequently destroys entire broods of caterpillars within a few days. So destructive has it been that it is estimated that the silk crop in Europe is damaged by it to the extent of many millions of dollars annually. During the past ten years it is believed to have reduced the income of silk breeders some twenty-five per cent., and in 1879 was said to be the main cause in the great falling off in the silk crop of that year, which was only about one-fourth of the amount ordinarily produced. The celebrated Pasteur investigated this disease, and found it to proceed from the presence of an exceedingly minute form of bacteria, so excessively small that it has been estimated that it would require eight millions of them to cover the head of an ordinary pin. When water containing these minute organisms is sprinkled on the leaves on which the silk worms are

fed, they are found to be rapidly infected and capable of communicating this pestilential disease to others with which they are associated. The bacteria may be preserved in a torpid condition without loss of effectiveness for at least a year, probably for several years, and that without any particular care, and when required for use can be rapidly propagated in a suitable fluid.

In my address to you last year I referred to a similar form of disease which had occurred among cut-worms so abundant in clover fields in the Ottawa district, and in 1878 and 1879 to a similar trouble among the forest tent caterpillars at that time so abundant. Now I am glad to be able to report a similar disease among the cabbage worms, and to indicate to you some practical results arising from investigations regarding its nature and mode of operation.

Throughout most of the State of Illinois and in some parts of Michigan, it was observed last autumn that a large proportion of the cabbage worms sickened and died. Hundreds of their bodies were to be seen rotting on the cabbage leaves or shrunken and dried to a blackened fragment. This was soon brought under the notice of the State Entomologist of Illinois, Prof. S. A. Forbes, a most careful and indefatigable observer, who at once proceeded to investigate the cause of this caterpillar plague. He found the disease at first to be very unevenly distributed, some isolated fields showing no trace of it, while others not far distant were fairly reeking with death and decay, but as the season advanced it spread in every direction until in some districts almost every worm perished. He says, "We can conceive something of the significance of this disease if we imagine the terror and dread which would seize mankind if such a plague should suddenly assail human life. Whole towns would be depopulated and the dead would rot in the streets by hundreds. There would be no escape for any, because the contagion would be conveyed by the very food and drink by which life was sustained."

By dissecting specimens of the dead caterpillars, the microscope showed their intestines to be full of undigested food and swarming with a species of micrococcus, which appeared in the form of excessively minute spheres about one twenty-five thousandth of an inch in diameter, sometimes single, sometimes in pairs, and occasionally in strings of from four to eight. He found that these minute organisms could be readily cultivated in beef broth, and that a single drop of fluid from a diseased worm introduced into a vessel of such broth, would in two or three days render the

whole contents milky with myriads upon myriads of these microscopic organisms precisely the same as those taken from the diseased larvæ. He also found by experiment that the disease could be communicated to other species of caterpillars. Experiments continued during the present year have shown that by propagating this form of bacteria in the manner described, and mixing a pint of a well-charged culture with a barrel of water and syringing cabbages with this fluid, the disease may be introduced, thus furnishing us with another means of defence against some of these injurious insects.

A new strawberry insect has appeared in our midst which is deserving of notice. In the latter part of June last public attention was called to this subject by some paragraphs which appeared in the newspapers. The depredations of the insect were first observed in Staten Island, New York, causing grave apprehensions among the strawberry growers there; it appeared also about the same time in some parts of Michigan. The Entomological Bureau of the Department of Agriculture in Washington promptly took steps to investigate the subject, and the Chief of the Bureau, Prof. C. V. Riley, proceeded in person to enquire into the character and extent of the injury, with the view of suggesting measures for its abatement. The results of this work have not yet reached us, beyond some brief notices which appeared in the press, in which the nature of the injury was stated and the name of the insect given. This new pest was found to be a small curculio which has been known to Entomologists in this country for more than fifty years under the name of *Authonomus musculus*. It is a small snout beetle which measures, including the beak or snout, only one-tenth of an inch. The body is of a dull reddish colour, punctured, and dotted and spotted with white; different specimens vary much in their general hue, some being found very dark, occasionally almost black. Heretofore it has been met with only in the collections of Entomologists, who have found it to be very generally distributed throughout the Middle, Southern and Western States, and also in Canada, but nowhere in any particular abundance, and no one had thus far suspected it to be guilty of any injurious propensities; indeed, little or nothing has been known of its habits or history. A few days after its appearance in this new role—as a strawberry pest—was announced in the United States, I received a package from Mr. J. C. Morgan, an energetic strawberry grower in Barrie, Ontario, intimating that a destructive insect which had never been noticed before was seriously injuring some of the strawberry beds in that neighbourhood, an

insect which seemed to have a special liking for that variety of strawberry known as the Sharpless. When speaking of this pest Mr. Morgan says: "It climbs up the flower stalk, selects one flower, and deliberately and quickly cuts it off; as soon as the flower falls or hangs over by a small thread, the insect crawls down, runs up the next stalk and commences again. This performance is varied by puncturing the open blossom in several places, which said blossom will also come to grief. It is found in immense numbers on the Sharpless, slightly on the Wilson, and on no other berry as yet." On examination this was determined to be the same species as that which had occurred on Staten Island and in Michigan. It is remarkable that this insect never met with before in any great number, should have occurred in such abundance at points so distant from each other as Staten Island, N. Y., Michigan, and Barrie, Ontario, all about the same time, and not be reported as occurring at intermediate points. In the absence of further knowledge of the life history of this insect, we can only suggest as a remedy the use of Paris green and water in the proportion of a teaspoonful of the poison to two gallons of water, which if applied to the vines with a syringe when the beetles are troublesome, would probably destroy many of them.

Further complaints reached us during the early summer months of injury done to the blossoms of the grape by the Rose Beetle, *Macrodactylus subspinosus*. I can only repeat what has been already several times stated, that this pest may be much lessened, if not entirely got rid of, by jarring the vines early in the morning while the beetles are in a semipid state and collecting them on sheets and destroying them.

The pea crop has for the past year or two been unusually free from the Pea-bug, *Bruchus pisi*. Now that the life history of this insect is so well known, farmers are more careful in selecting the seed, while seed dealers by special treatment are enabled to destroy the insects in the peas before offering them for sale. The gratifying immunity from this pest and the large saving thereby effected, is doubtless to be attributed mainly to greater care in these particulars.

In the address presented to you in 1880, I offered some remarks on the relations existing between birds and insects, and expressed the opinion that while the soft-billed insectivorous birds are exceedingly useful, that birds in general are not of such great use in subduing injurious insects as is commonly supposed, and that destructive insects are controlled to a far greater extent by their insect enemies and by the diseases to which

they are subject. Experience since gained has confirmed this opinion. During the period which has elapsed much discussion has taken place regarding the English sparrow, which has now increased to a considerable extent in many of our towns and cities, and occasional flocks of them find their way into the country. While this fearless little bird has had many advocates, the weight of evidence is undoubtedly against it, and it now stands convicted on several counts: of destructive propensities from the grain it destroys and devours and the injury it does to fruit trees by eating the buds; of pugnacity, which results in its driving away other and more useful native birds, while on the other hand the good it does in the way of consuming injurious insects, as proven by the examination of the crops of many of them, is comparatively small. The question is often asked by the friends of the sparrow, when the merits of this little emigrant are under consideration: "How is it that we hear no complaints of its depredations in England, where it has so long been a common bird?" Frequent complaints are made in England regarding it, and measures urged for its destruction. In recent reports issued there, especially those published by that well known and talented authoress, Miss E. Ormerod, we find serious charges recorded. One writer states that the sparrow has greatly increased in England during the past ten years, that large flocks of them sweep down on the wheat fields, devouring and destroying a considerable proportion of the grain. It is estimated that one million pounds sterling would not repay the farmers of England for the yearly loss sustained through the depredations of this quarrelsome pest. Besides the direct injury thus occasioned, it is said that sparrows prevent the increase of swallows, and drive the soft-billed insect-eating birds, which feed largely on the eggs and larvæ of insects, from the gardens and orchards, while they seldom eat a caterpillar. Another bears evidence of having seen a field of wheat so utterly ruined by legions of sparrows that it was left uncut; many other similar instances are cited. It is highly probable that we shall in the near future have many occasions to regret that this bird was ever introduced into Canada.

During the past year some interesting facts have been published bearing on the retarding influences of cold on the development of insects, as seen in the arctic regions. These observations have extended over several years, and show that butterflies which in the warmer regions of the earth pass through all their transformations once or more in a season, take two or three years to complete a single cycle where the summer season is very short and the prevailing temperature low.

Besides the report of our own Society, which contained much useful and practical information, there has been issued in Canada since I last addressed you a preliminary report by the Dominion Entomologist, Mr. Jas. Fletcher, containing some useful records of work done during the year and plans for more extended usefulness in the future. It is cause for sincere regret that our esteemed fellow-laborer has in consequence of a severe affliction been obliged to postpone the completion of some of his cherished plans, and thus the completion of work begun with much vigor and promise has been unavoidably delayed. We sincerely hope that he may soon be entirely restored, and thus be enabled to carry on with increased efficiency the work he has undertaken. In addition to the excellent annual report of Miss Ormerod, which has already been noticed, there has been issued in England a useful pamphlet on "Insects Injurious to Hop Plants," prepared for the Agricultural Department of Great Britain by Chas. Whitehead. This issue is to be followed by others on grain, root and fruit crops, and it is sincerely hoped that the issue of these publications will awaken in the minds of the agriculturists of Great Britain a livelier interest in the importance of the study of economic entomology. In the United States much has been done. The Entomological Bureau in Washington, under the able direction of Prof. Riley, has most efficiently continued its good work by investigating insect pests in all parts of the United States, and in endeavoring to devise useful measures for their destruction. The reports issued during the past year have been most valuable, and are profusely illustrated. The annual report of Prof. Forbes, State Entomologist of Illinois, is also especially worthy of notice. Very excellent papers on economic entomology have also been published by Prof. J. A. Lintner, State Entomologist of New York, Prof. A. J. Cook, of Lansing, Michigan, Prof. Herbert Osborn, of Ames, Iowa, and others.

Mr. Wm. H. Edwards, of Coalburgh, W. Va., has published a revised catalogue of the Diurnal Lepidoptera North of Mexico, and has continued the publication in parts of his magnificent work on the Butterflies of North America. He has also continued his observations on the life histories of American butterflies, the results of which have been published in the monthly organ of our Society, the CANADIAN ENTOMOLOGIST. A new list of Coleoptera of America North of Mexico, by Samuel Henshaw, has also appeared.

Some indication is given of the progress being made in the study of Entomology in any community, by the extent of information recorded in

reference to the Diurnal Lepidoptera found in such district. If such an indication may be taken as reliable, we in Canada have made much progress within the past few years. Twenty years ago when our Society published its first list of Canadian butterflies, the number of species then known was 66; now our lists contain no less than 210. For a large proportion of this great increase we are indebted to the labors of Mr. G. Geddes in the Rocky Mountains and North-west Territories, and to those of Mr. James Fletcher in British Columbia. These gentlemen have been indefatigable in their work, and at the same time most successful. While there may not now be many more laurels to gain among the Diurnal Lepidoptera, there are other inviting departments of labor in which any industrious Entomologist may add much to our present knowledge. We are glad to know that Mr. W. H. Harrington is making good progress in the collection and study of our Hymenoptera; we hope that some of our members will be induced to undertake in a similar way our Diptera, Neuroptera, Hemiptera and Orthoptera, so that we may soon be able to form some idea of the richness of our territory in these long neglected orders.

WM. SAUNDERS.

ELECTION OF OFFICERS.

The following named gentlemen were then duly elected as officers of the Society for the ensuing year: President, William Saunders, London, Ont.; Vice-President, Rev. C. J. S. Bethune, M. A., Port Hope, Ont.; Sec.-Treas. and Librarian, E. Baynes Reed, London, Ont.; Council—J. Fletcher, Ottawa; Rev. T. W. Fyles, Quebec; J. A. Moffat, Hamilton; W. H. Harrington, Ottawa, and G. J. Bowles, Montreal. Editor CANADIAN ENTOMOLOGIST, Wm. Saunders; Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, Jas. Fletcher, and E. Baynes Reed. Auditors—W. E. Saunders, H. P. Bock; Delegate to Royal Society—W. H. Harrington.

LARVÆ OF HEMILEUCA MAIA, DRU.

BY CHAS. F. GOODHUE, WEBSTER, N. H.

It was my good fortune, in May last, to find a brood of the larvæ of this species. As they were very different from the only description we have seen, i. e., that of Morris in his Synopsis, we herewith give a description of three of its stages. As all the stages were not observed we will begin with the last, as it will by that means be more short. Mature larvæ, 1.50

to 1.75 inches long, color black, thickly dotted with yellowish white. Head slightly triangular, smooth and shining. Head, top of segment next to it, feet and vent, rich reddish brown.

On segments 2, 3, 4, 5, 6 and 11 are eight rather long branching black spines. Segments 7, 8, 9 and 10 have six, and segments 12 and 13, seven. The two dorsal spines on segments 3 to 11 and one on 12 are surrounded at the base with a spreading tuft of yellowish bristles. Preceding stage like the last, only there are no yellowish dots on the body. The next before this, and the first stage observed, the larvæ are entirely black; no yellowish bristles round base of dorsal spines as in the two last stages.

The larvæ were somewhat different in color for a few hours directly after the last moult, from what they were afterwards, being lighter in color, but they were all alike, and like the description given in twelve hours after moult.

July 9 they went under a few loose leaves on the bottom of the feeding box and made a cell in the débris without spinning any silk.

Four days after some of them had changed to pupæ, and in seven or eight all had changed.

The pupæ are .75 to .85 inch long, dark brown, head case smooth and rounded; the joints of the abdomen are close, making the pupæ rather rigid. The pupæ closely resemble those of *Hyperchiria Io*, but smaller and a trifle more slender.

The moths came out the middle of Sept.

The larvæ were found on common meadow sweet (*Spiræa salicifolia*) and were reared on it. We have always thought that the food plant would prove to be something besides oak, from the habits of the moth, it being almost invariably found on low, wet meadow land, oftentimes at a long distance from oaks of any kind. Willow is also given as one of its food plants.

The larvæ are gregarious, many feeding on a single twig, and when at rest are closely packed together, much resembling the larvæ of *Vanessa antiopa* in this respect, as they also do in looks.

The moth is usually common in this locality during the last of Sept., when it may be found on the wing in the middle of the day, coursing back and forth over the low lands.

The males are usually in excess of the females, thirty to one, and it is uncommon to get a perfect female, they nearly always being torn and ragged.

DESCRIPTION OF THE PREPARATORY STAGES OF
PHOLISORA CATULLUS, FABRICIUS.

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

EGG.—Conical, the base flat, the top truncated, rounded, and divided from centre outward into eight or nine rounded, nearly equal, smooth lobes; at the micropyle a deep depression; sides marked by about 15 vertical ribs, low, rounded; the spaces between the ribs a little excavated, and crossed horizontally by many fine striæ; color pale yellow-brown, or luteous. Duration of this stage about five days.

YOUNG LARVÆ.—At 12 hours from egg, length .04 inch; slender, the middle segments somewhat thickest; color green-orange, under side green-yellow, as are the feet and legs; segment 2 is whitish, with a black chitinous dorsal collar in front; head sub-globose, black-brown, shining. Duration of this stage three days.

After first moult:—Length, at 12 hours, .12 inch; shape as before; color yellow-green, thickly covered with minute yellow points, each of which gives out a short fine whitish hair; the collar on 2 black; head sub-cordate, roughened, black-brown, with a covering of fine down. Duration of this stage three days.

After second moult:—Length, at 12 hours, .16 inch; shape as before; color same; head as before. To next moult three days.

After third moult:—Length, at 24 hours, .42 inch; stout, of nearly even thickness from 4 to 12; color yellow-green, with tubercles and hairs as in previous stages; head as before. To next moult two or three days.

After fourth moult:—At 12 hours, length .6 inch. Three days later,

MATURE LARVÆ.—Length .7 inch, greatest breadth .16 inch; obese, a little thickest in middle segments, but very stout from 4 to 12; color yellow-green, thickly covered with fine flattened tuberculations, of irregular sizes, whitish, each giving out a fine short white hair, whereby the surface is downy; a faint sub-dorsal yellow stripe on either side; under side, feet and legs, more green; segment 2 has a narrow black chitinous dorsal collar, cleft at summit; rest of 2 whitish; head sub-cordate, rough, black-brown, covered with fine down as the body. From fourth moult to chrysalis seven days.

Some larvæ in last stage have no trace of the sub-dorsal stripes; and in some the color is brownish-green.

CHRYsalIS.—Length .52 inch, greatest breadth .14 inch; cylindrical,

slender, thickest in middle and tapering slightly to head; the head case compressed on dorsal side, so that there is an even slope from top of mesonotum to the end; this last is rounded, and at either end of the curve the ocellar prominence is set, also rounded, and not projecting so far as the top of the curve; all this part thickly beset with short bristles; the mesonotum round and scarcely elevated, color greenish-yellow, or greenish-brown, according to the color of the larva, covered with a whitish mealy dust; on either side of dorsum, at base of head case, is a small round black process, surmounted by a circle of short bristles. Duration of this stage when the imago comes forth the same season, about seven days. From laying of egg to imago about thirty days.

This pretty species flies quite generally throughout the United States to Pacific, and Mexico; also in the southern part of British America. Abbot says it is to be found about gardens and fields, and among melon blossoms. It is somewhat abundant in some years in my own garden, and I have observed it often about melon and cucumber patches, alighting on the leaves. Probably its fondness for gardens is because its larval food plant, pig-weed (*Ambrosia*) abounds in such places. I know of no other food plant, but Abbot gives horse-mint, *Monarda punctata*, *Origanum*, *Chenopodium*, which he calls lamb's quarters, and another plant called "careless," but which neither Wood nor Gray help to identify. The egg is laid singly on the upper side of a leaf, sometimes near the edge, but generally near to the mid-rib. It is of a peculiar shape, quite different from that of any species of *Nisoniades* which I have seen, and reminds one of a confectioner's cake-mould, or of an inverted basket made of fine willow twigs. The color, too, is peculiar, as compared with other Hesperian eggs, which are usually white or yellow-white when laid, being red-brown, and looking on the leaf like a speck of dust. I have often found several eggs on a stunted plant not more than two or three inches high growing on the gravel walk.

The young larva goes to edge of its leaf, cuts in about one tenth inch, and folds over a corner so separated, binding it down by two or three threads. Here it lies concealed till the first moult has passed, and feeds on the fleshy part of the leaf within the fold. After first moult the larva draws the leaf together by the edges, and from second moult on the hiding place is readily distinguished by the oval swelling of the leaf. When about to moult the case is thickly lined with silk, and closed at every point. The larvæ come outside to feed and return to their cases, and

feeding takes place at night. Some of my examples were kept in tin boxes, and on one occasion I surprised one of the larvæ feeding at a distance from its case; at another, one was close to the opening and hastily retreated into the case, tail foremost, as I opened the box. They are perfectly neat in their cases, the frass being always expelled or voided outside. At any time after the first stage and to maturity, on slitting a case, the larva will be found lying with anterior segments bent round so that the head comes a little beyond middle of body, and in nearly every instance I have found the tail towards the closed end of the case.

There seem to be two broods of the imago in West Virginia, flying in June and August. The larvæ found in September have hibernated, to pupate in the spring, but larvæ of summer produced butterflies the same season. The larva is full-grown when hibernation takes place, and after awaking, pupates almost immediately, that is, after 2 or 3 days. This habit is like that of species of *Nisoniades* observed. Abbot, Ins. Ga., says that a larva of *Catullus* which pupated 18th June gave butterfly the 26th; another which pupated 29th July gave butterfly 5th August; and one which "enclosed itself 14th Sept., gave butterfly middle of March." By this I conclude there are three broods of the imago in the Gulf States.

I have, as I write, 13th Sept., 1885, two larvæ in hibernation, one of them under a leaf on a bit of paper. The leaf is moulded to an oval, rather a half oval, cut lengthwise, the edges flattened all round, and everywhere bound to the paper by close web, so that quite an effort is required on my part to raise the edge in the least. The other caterpillar lies under a small, oblong slip of paper upon a larger piece which at one end is bent considerably. At that end the opening between the two is a half circle. This is closed by a sort of lace work, full of small openings, and the web first spun is strengthened by several stout threads which lie upon it and cross in various ways. This sort of drum-head covering would resist a strong attack of any enemy but a bird or mouse. The other three sides of the slip of paper are held down by stout threads or cords each of very many fibres, having their attachments upon bases of web thickly spread upon the under paper and at the edges of the upper one. How these threads are brought together at the middle into such a cord is not apparent, but they seem to be laid side by side and cemented. In color these cords are black, while the web itself is pale brown. One cord holds the end of the slip, two hold one side, one of them near either end, and three hold the other side. In addition to this the three sides

have web woven all around within. This is the sort of foresight these larvae exercise in providing for hibernation.

Except the brief account of Abbot above referred to, I have found nothing relating to the history of *Catullus*. Mr. Scudder, in *Butterflies*, p. 9, fig. 14, gives a cut of the egg, which is not a good one, from an example distorted perhaps by alcohol. Instead of rounded lobes at top, this part is made up of illy-defined points, and the sides are not symmetrical. Abbot figures the mature larva pretty well, the head excepted, which is out of drawing, and discovers three whitish points on front face. In nature these spots have no existence. The chrysalis is better. So far as I am aware, this is all relating to *Catullus* hitherto published.

PREPARATORY STAGES OF ICHTHYURA ORNATA.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter .035 of an inch, about the same in height; blunt, conical, the base flat; smooth; white, a dull red band round each a little below the middle, which is pretty well defined on its lower edge, but the upper is irregular, sometimes a small red speck on the apex. Duration of this period 10 days.

Young Larva.—Length .08 of an inch. General color grayish white, a purplish red band across each of the following joints, 2, 5, 7 and 12, with a faint row of the same along each side. Head jet black, broader than the body; joint 12 a little elevated; thoracic feet black, the others concolorous with the body; the body sparsely covered with white hairs half the length of the larva. Duration of this period from 2 to 3 days.

After the first moult.—Length, .15 of an inch; color much as before, the red on joints 5 and 7 broader, the latter a little faint, the lateral stripes more distinct, three faint stripes on the dorsum; all these stripes of the same color as in first stage. Duration of this period, 6 days.

After the second moult.—Length, .25 of an inch. Of the same general appearance as before, but some change in color. Head, jet black. Dorsum yellow, slightly green tinted, containing three fine reddish purple stripes; joints 5 and 12 slightly elevated and reddish purple, as also the anal extremity and a narrow shield on joint 2. On the sides above the stigmata a broad reddish purple band; below this the color is yellow, not so bright as on the dorsum, mottled with purple, the purple hardly in lines

except above the feet; thoracic feet black, the others light. Duration of this period, 4 days.

After the third moult.—Length, .35 of an inch. Of the same general character as during the preceding stage; the dorsum yellow, with three reddish purple lines, but the piliferous spots on all the joints but 5 and 12 are more prominent and brighter yellow; the lateral stripe purple as before, but on some examples it contains a darker central line, below this a row of yellow piliferous spots, the area below these yellowish and striped by about three broken lines. Joints 5 and 12 have each a transverse band of purple and a row of black piliferous spots, slightly elevated. Venter and anal part, translucent whitish; head, brown; hairs, white. Duration of this period, 7 days.

After the fourth moult.—Length, .65 of an inch, but few changes from the preceding period. Marked as before, but more robust; the broad lateral stripe pale and composed of mottlings of red, brownish tinged, on a whitish ground, the thin dorsal lines the same; piliferous spots yellow; head paler than in preceding period.

Mature Larva.—Length, when at rest, from .85 to .90 inch; nearly cylindrical, a little enlarged through joint 5; head, .12 inch in diameter; joint 5, .15 inch. In color an almost uniform mottled reddish brown and whitish, the latter in irregular annulations to the brown patches; a dorsal line, and one on each side of it, a little more distinct brown. In some examples the brown is slightly greenish tinted, and the white is more extensive, giving the body a slight gray tint. Piliferous spots, yellow; head, light brown, mottled so that the anterior parts of the cheeks are darker brown; legs concolorous with the body; stigmata black. Duration of this period, 5 days.

Chrysalis.—Length, .55 of an inch; depth of thorax, .16 inch; of abdominal joints 3 to 5, .20 inch, from which it tapers gradually back; cylindrical, slightly depressed on dorsum of joints 1 and 2; abdomen blunt, conical; wing, tongue and leg cases extending to a little back of the middle of joint 5; the anterior part of the abdominal joints slightly punctured; the rest of surface smooth except corrugations on the wing cases. Color, chestnut brown, the wing cases darker, eyes dark brown. Duration of this period from 8 to 10 days.

The eggs that furnished the larvæ for the preparatory stages given here were sent me from Truckee, Cal., by Mr. C. F. McGlashan, June 15, 1885, the eggs having been deposited June 9th. This gives us from 43 to

45 days from the egg to the imago, a period about the same here as *Palla*. I am inclined to think, however, that in its home in the Sierras its growth is not so rapid, probably requiring a longer time for development, and finally passing the winter in the chrysalis state instead of producing the imago as it did here. A part of this is conjecture, however, for though I learned from Mr. McGlashan's letters that his chrysalids had not hatched some time after mine had, I do not know but they may have done so since. With us the species would be double brooded the same as *Palla*, the last chrysalids hibernating.

Like *Palla*, the food plant is willow. As soon as hatched the larvae begin to fasten leaves together with silk, forming a retreat or vivarium within which they live together. When at rest the anterior part of the body is bent to one side. This was noticed more after the second moult than before, but continued through the larval stage. During the early periods they ate the parenchyma of the leaves, leaving the framework. When ready to spin their cocoons some leaves were fastened together, and inside this was spun the cocoon that did not differ materially from other species.

BRITISH COLUMBIAN HYMENOPTERA.

BY GEO. W. TAYLOR, VICTORIA, B. C.

In the June number of the CANADIAN ENTOMOLOGIST, p. 114, there is a paper by M. L'Abbe Provancher, containing descriptions of a new genus, *Platysoma*, and 7 new species of Canadian Hymenoptera. Six of these new species, *Ich. Vancouveriensis*, *Platysoma tibialis*, *Limneria compacta*, *Mesoleptus fasciatus*, *Phylax pacificus* and *Phylax niger*, are from Vancouver Island, and I am under the impression, for reasons which I will now state, that the specimens of these species from which M. Provancher's descriptions were made were from my collection, though no mention of my name appears in M. Provancher's paper.

In February, 1883, in response to the request of Mr. W. Brodie, of Toronto, I sent to him specimens of all the Vancouver Hymenoptera I then possessed. In June, 1883, Mr. Brodie returned named 81 species, which I have enumerated in vol. xvi., p. 77, of the CAN. ENT., and a few more were returned to me in Feb., 1885, but he made no mention whatever of the fact that any of the species named were new.

A reference, however, to my list will show that all of M. Provancher's new Vancouver species are there included, and it appears most probable, therefore, that he had my specimens from Mr. Brodie and wrote his descriptions from them. He acknowledges in the paper referred to that the insects were sent him by Mr. Brodie.

From what I know of M. Provancher, I feel sure that if he had been informed by Mr. Brodie that the specimens were not his own, but mine, he would have mentioned in his paper the name of the collector as well as the locality in which they were to be found.

Now, while I care but little about my name appearing as the captor of new species, I hold that such action as Mr. Brodie's results in a positive injury to science. First, because had I known that I possessed a number of new species, I should most certainly have placed them where they would have received greater care and have been of greater use than in my cabinet, viz., in the collection of some public museum. Secondly, had I been communicated with, I would have submitted to the describer a series of each species, for I have a series of all but one, and in some cases I have both males and females, and everyone will admit that a description made from a series is of much greater value than one made from a not-over good single specimen.

Of course it is just possible that the insects described were collected by some one else. If this is so, the coincidence is an extraordinary one.

CORRESPONDENCE.

A RARE SPHINX ADDED TO THE CANADIAN LIST.

Dear Sir: I wish to record as an addition to the Canadian fauna, the exquisite little Sphinx moth, *Pterogon Clarkie* Boisd., a perfect male of which has been generously presented to me by my friend, the Rev. G. W. Taylor. This little gem is well figured at No. 5, Plate xiii., of Strecker's Lepidoptera. The specimen in question was taken at Victoria, Vancouver Island, about May 15, 1884, while hovering over the flowers of a lilac bush in company with *Hemaris rubens* H. Edw. and *Papilio Rutulus v. Arizoniensis* W. H. E., and *Eurymedon*. The coloration of this species is very beautiful. The general hue of the primaries is olivaceous, but

more of a brown than a green tint. The secondaries are bright yellow with a broad black marginal band and white fringe. The expanse of the wings is $1\frac{3}{8}$ inches. The markings of the primaries somewhat resemble those of *Darapsa myron* Cram., and consist of a small dark patch on the costa near the base, a dark median band and discal spot, and a subterminal dark line which widens to a large triangular mark at the apex. The marginal black band in my specimen is much wider than in the specimen figured by Mr. Strecker.

J. FLETCHER, Ottawa, Ont.

PERSONAL.

Dear Sir: In the last Report of the Agricultural Dept. of Washington, Mr. C. V. Riley speaks of the "general untrustworthiness" of my "work" as illustrated by my referring in my New Check List *Phycis juglandis* as a var. of *indiginella*, and using the term *Phycis* instead of *Acrobasis* (used formerly by me). As to the first, I did so because Le Baron thought *juglandis* might be a variety. I have usually been taken to task by Mr. Riley for considering varieties as species. In a Check List, I need not say, the author is not bound to know all about every species he includes. As to the latter, Haworth's name *Phycis* must be used for some genus of the *Phycidæ*. Dr. Walsh having used it for our species *indiginella*, led me to follow this example rather than for *Pemphelia*. It should be remembered that these comments on the character of my work in this instance come from a person who in his descriptions of N. Am. *Phycidæ* failed to give a *single structural character* by which his species could be generically referred, as I have already shown. My classification of the *Pyralidæ* in the Check List has elicited the approval of Prof. Fernald, who is universally recognized as a high authority in this family. I am sorry that Mr. Riley should abuse Government Reports by inserting such personal and unwarranted remarks.

AUG. R. GROTE, Bremen, Germany.

BUTTERFLIES OF NORTH AMERICA.

We are glad to be able to announce that it is the intention of Mr. W. H. Edwards, author of that superb and well known work on the Butterflies of North America, to proceed with the third volume without delay. It will be the author's endeavor to maintain in every respect the high character of this work, which as it involves a very large outlay, will we trust be widely appreciated and meet with that liberal patronage which it so well deserves.

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