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The Canadian Entomologist.

VOL. XV. LONDON, ONT., OCTOBER, 1883.

No. 10

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

GENTLEMEN,—Twenty years ago, on the afternoon of the 16th of April, 1863, there met at the rooms of the Canadian Institute in Toronto, nine gentlemen interested in Entomology, for the purpose of organizing a Society having for its object the advancement of Entomology in Canada. These gentlemen had been called by special invitation of the Rev. C. J. S. Bethune and myself, and in addition to the nine who responded by their presence, letters of apology were received from five others, expressing regret at their being unable to attend; these fourteen comprised all who at that time took an active interest in Entomology in Canada.

A Society was duly organized under the name of The Entomological Society of Canada, with the late Professor Croft, of Toronto, as its first President. Two scientific papers on insects were presented and read, and a number of interesting insects exhibited. Application was made to the Council of the Canadian Institute for the use of a room in their building, which was kindly granted free of expense, and it was resolved to hold monthly meetings for the discussion of Entomological subjects.

In December of the same year a committee was appointed to prepare and publish catalogues of the names of insects in the orders of Coleoptera and Lepidoptera, and in May the following year the committee reported that the list of Lepidoptera had been completed and published, and that considerable progress had been made in determining the species of Coleoptera, but not sufficient to warrant the publication of the catalogue. This catalogue was completed and published shortly after. Before the close of this meeting committees were appointed charged with the special duty of paying particular attention to the study of insects injurious to vegetation.

Previous to this nothing had been done in Canada in the important department of Economic Entomology; no information was available to the farmer or fruit grower in reference to most of the insect pests which destroyed his field crops or fruit, unless he happened to be the fortunate

possessor of a volume published in New England by Dr. Harris, under the title of "Insects Injurious to Vegetation in Massachusetts," and this, although a very useful work, only partially met the wants of the practical farmer. Dr. Fitch, State Entomologist for New York, had published his first nine reports, and was almost the only active laborer in this important department of insects injurious to agriculture, but his works were not accessible to many in this country.

In scientific Entomology but little had been done in Canada up to this period. Several catalogues of the names of insects captured in this country had appeared in the "Canadian Naturalist," the organ of the Natural History Society of Montreal, and the occurrence of several rare species of butterflies had been noted. Messrs. Wm. Couper and E. Billings, of Montreal, had also communicated some papers to the same journal urging the importance of the study of Entomology and referring to the habits of some of the pine borers and other prominent insects; but the circulation of the "Naturalist" was so limited that the information given reached but few in the community.

The Entomological Society of Canada at first had no funds to enable them to publish reports of their proceedings beyond the small sum derived from the annual fees of the members, but among these were a number of active workers, who, by careful and systematic observation and study, were rapidly accumulating stores of knowledge which were destined to be of much value in the future to the great community of farmers and horticulturists. At first the proceedings of the infant Society were published in the Canadian Journal, but soon it was felt to be most desirable, in order to give them the prominence they deserved, that the records of facts observed by the members should be published in a separate form, and early in 1867 an effort was made to obtain some assistance from the Canadian Government to aid the Society in carrying out this object; but at a meeting held on the 1st of June, 1867, a communication was presented from the Finance Minister of the United Provinces to the effect that he could not recommend any fresh grants for scientific objects, as the country was on the eve of confederation. The annual report of the Secretary presented at this meeting showed that the membership had been increased to 48. The meeting was to have been followed by a field day, but the Fenian Raid, which just then occurred, called some of the members away to their duty as volunteers, and others to the defence of their homes.

In August, 1868, the first number of the CANADIAN ENTOMOLOGIST appeared under the editorship of our esteemed coadjutor, Rev. C. J. S. Bethune, of Port Hope. It was a humble looking sheet of eight pages only, and this was not promised to be issued at any regular intervals, but from time to time, as material accumulated which was thought to be worthy of publication. To meet the expenses of publication, voluntary contributions were made by many of the members, and it was thus sustained and issued monthly for fifteen months, during which time it was found to be so useful that it met with encouragement everywhere; it had also acquired a reputation abroad, and many Entomologists in Great Britain and the United States had become regular subscribers. Early in 1870, the Council of the Agricultural and Arts Association of Ontario, recognizing the important bearing of Entomology on Agriculture, liberally appropriated the sum of four hundred dollars in aid of the Entomological Society for the year ensuing, on the following conditions: That the Society continued to publish the CANADIAN ENTOMOLOGIST, that it furnish a report to the Council on insects injurious or beneficial to Agriculture, and that a small cabinet of insects illustrating the various orders be made and placed at the disposal of the Council. These conditions were gladly complied with and faithfully carried out, and the report, consisting of 64 pages illustrated with 61 cuts, was printed in the report of the Commissioner of Agriculture for that year. During the latter part of 1870 an amendment to the Agricultural and Arts Act was introduced by the Hon John Carling, then Commissioner of Agriculture for Ontario, which provided for the incorporation of the Society under the name of "The Entomological Society of Ontario," with a yearly grant of five hundred dollars from the public funds of the Province, on condition that the Society prepare annually for the Commissioner of Agriculture a report on the subject of insects injurious or beneficial to the farm and garden, with the understanding also that the CANADIAN ENTOMOLOGIST should be continued. During the period which has since elapsed, the Ontario Government have recognized the value of the service rendered by the Society to the agricultural interests of Ontario by increasing the grant several times, until it now amounts to one thousand dollars a year. The liberality of the Government has greatly stimulated the work of the Society.

The practical or economic aspect of this work has been presented to the public mainly in the series of thirteen annual reports, which have been submitted to the Commissioner of Agriculture by members of the Society,

and published in the Commissioner's report. In these publications the insects injurious to the various field crops and fruits have from time to time been discussed, together with the remedies which have been suggested for their destruction. The value of these reports is indicated by the demand which has arisen for them, owing to which it has been found necessary to greatly increase the number of copies issued ; some of those belonging to the earlier years are now quite scarce and difficult to obtain. They have been most favorably noticed by the press in all parts of America and Great Britain, and thus the good work has been brought prominently into notice. If we contrast the amount of information now available to our farmers and fruit growers on the nature and life history of destructive insects, and the best methods of subduing them, with our knowledge on this subject fifteen years ago, the vast progress made will at once be recognized, and it is to the unselfish labors of the members of our Society that much of the credit for this is legitimately due. I have no hesitation in asserting that the value of the information thus distributed has returned to the country by the losses which have been lessened or prevented many times the amount which has been granted to the Society during the past twelve years from the public moneys of this Province.

The CANADIAN ENTOMOLOGIST has been regularly issued, and is now in its fifteenth volume. The volumes published have contained a vast amount of useful scientific information, which, by its wide dissemination, has been one of the chief factors in the progress of entomology in this country. The work of our Society in this department has attracted much attention abroad, and our journal has been sought after by many of the learned Societies in Great Britain, the United States, France, Germany, Russia and Sweden, and regular exchanges of our publications with theirs on equal terms effected. Thus from small beginnings the Entomological Society of Ontario has come to be recognized as one of the important aids to scientific progress. It is much to the credit of Ontario that for some years the CANADIAN ENTOMOLOGIST was the only regularly issued periodical specially devoted to the interests of Entomology on the American continent, and that it still commands the contributions of many of the most distinguished entomologists in all parts of the country.

During the period of the existence of the Society a large collection of insects has been made, a good library accumulated, and an excellent working microscope and other facilities for the study of insects provided, all of which are readily accessible here to any of our members who may

reside in London, or who may visit us from a distance. The collection shown, at the request of the Government, at the Centennial Exposition in Philadelphia in 1876, attracted much attention, and was admitted by all to be the most complete exhibit of North American insects ever brought together; the Society was awarded a gold medal on that occasion. Last year a request was made by the Minister of Fisheries for the Dominion of Canada that our Society would prepare and exhibit a collection of such insects as were injurious to fishes as well as those which served as food for fishes, to be sent with the Canadian exhibit to the Great International Fisheries Exhibition, now being held in London, England. The arrangement of this collection was undertaken by our worthy Secretary, Mr. E. Baynes Reed, who completed the work, and sent forward in due season forty cases of Canadian insects.

The large collection of carefully determined specimens in the cabinets in the Society's rooms in London, has also served a valuable purpose as a collection of reference, where collectors from all parts of our country can name their collections, and where all the books and appliances which can aid this work are ready at hand. As our knowledge of the insect forms found in our country increases, classified lists of their names are published by the Society for the purpose of aiding students in arranging their collections, and also indicating the work which has been accomplished.

During the past year a most complete and systematic index has been prepared by our Secretary, Mr. E. Baynes Reed, to the full series of our thirteen annual reports, by means of which the information they contain, in reference to any insect or subject, may be referred to with little trouble or delay. This has greatly enhanced the value of these reports, and opened the eyes of all to the vast fund of information they contain; the results amply repay the attendant labor and outlay of this compilation, and nothing would do more to add to the value of the CANADIAN ENTOMOLOGIST than the publication of a similar general index to the fifteen volumes of our monthly, now nearly completed. I trust our esteemed Secretary may be induced to continue the good work in this direction.

We have not been afflicted with any very formidable invasion of insect enemies during the past year. At the opening of the season the apple-tree aphid, which is generally common, was, in some districts, unusually abundant, and attracted some attention. The injury inflicted by them on the apple buds was not serious, and in a few days the buds expanded,

when the lice became scattered over the opening foliage and caused no further apprehension.

Later on, the tufted caterpillar of the white-marked tussock moth, *Orgyia leucostigma*, appeared in force, having hatched in multitudes from the numerous masses of eggs attached to the twigs and limbs of various trees. These eggs are usually partly sheltered by a dead leaf, or leaves firmly adherent. The mass contains from 300 to 500 white eggs, imbedded in a frothy, gelatinous substance; is of a grayish white color, with a nearly smooth convex surface, while there is usually attached to the mass the empty grey cocoon, from which the parent moth escaped. The eggs hatch about the middle of May, when the young larvæ at once begin to devour the leaves of the tree on which they are placed, rapidly increase in size, and when full grown present a handsome appearance. Their bodies are more than an inch long, of a bright yellow color, with a red head, three or four cream-colored tufts set in a black stripe along the back, two long black spreading plumes, extending forward on the anterior part of the body, and one at the opposite extremity. By gathering the clusters of eggs during the winter when they are easily seen, the depredations of this insect may be prevented; but should this simple measure from any cause be omitted, the larvæ may be destroyed on the trees by syringing the foliage on which they are feeding with Paris green and water, in the proportion of a teaspoonful of the poison to a pailful of water. This caterpillar is a very general feeder, and occurred this year on almost every species of deciduous tree, especially on street trees, and in lawns and parks, as well as in orchards.

The clover seed midge, to which the attention of the farmers of this Province was first called in the annual report of our Society for 1881, continues to extend its sphere of operations, and many complaints are being made of the failure of the crop of clover seed from this cause. The perfect insect is a two-winged fly, about the size and having much of the general appearance of the wheat midge. By the aid of a long ovipositor the insect pushes her minute eggs down the flower tubes in the young clover heads, and when hatched the tiny red larvæ devour the seed. In districts where this insect has fairly established itself, there seems to be but one method of subduing it, and that is to starve it out by ceasing to grow clover for a year or two. A large proportion of the larvæ may be destroyed by cutting the clover earlier than usual, just as it is coming into bloom, when, being only partially developed, most of them would perish.

The greatest danger arises from the possibility of their being distributed by the use of infested clover seed. The insect passes the winter either in the larval or pupal state, and in both of these conditions is often found amongst clover seed, and if sown with the seed the insect is placed amid conditions most favorable for its development. Seedsmen should carefully examine their seed before offering it for sale, and farmers should exercise similar caution before purchasing. The insects are very small, but are much larger than the individual seeds, and if a small quantity of the clover seed is passed through a fine sieve, these insects, if present, will be found along with the coarser weed seeds, with which clover seed is so often contaminated.

The maple Egerian, known also as the legged maple borer, *Aegeria aceris*, has prevailed during the past year in the neighborhood of London to an alarming extent, to the serious injury of some of our shade trees. These insects, which pass the winter in the larval state under the bark of the maple trees, change to chrysalids early in June, and about the middle of that month they protrude themselves from the bark to the extent of about half an inch, when in a very short time the mature insect escapes, leaving the empty chrysalis behind it. This is a very pretty, clear-winged moth, resembling a wasp, which, when its wings are spread, will measure about three quarters of an inch across. The transparent wings are adorned with bluish-black markings, the head is orange, the thorax yellow, and the abdomen bluish-black, banded with golden yellow. The female lays her eggs on the bark of the trees, preferring the red maple, *Acer rubrum*, although the other varieties of maple are also more or less affected. In a few days small larvæ hatch from the eggs, which penetrate through the bark, and feed upon the inner portion and sap-wood of the tree, making an irregular cavity, which is packed with the castings of the larva, mixed with minute fragments of wood. When full grown, it is about three quarters of an inch long, with a small yellow head and a white or yellowish white body, which is darker on the hinder segments. Where the larvæ are safely lodged under the bark, no remedy but the knife will reach them, but the moths may be prevented from laying their eggs by coating the bark with a mixture of soap and strong solution of washing soda, the mixture being made about the consistence of ordinary paint, and applied to the trees in the middle of June.

Within the past two or three years Paris green, mixed with water in the proportion of a teaspoonful to a pailful of water, has been recom-

mended as a remedy for the codling moth, the mixture being freely applied to the apple trees with a syringe or force pump soon after the fruit has set. The results of experiments conducted during the past season, go far towards establishing the value of this remedy, the number of wormy apples having been materially lessened on the trees so treated. In my own experiments, where the mixture was applied to alternate trees, the proportion of wormy fruit in some instances on the trees syringed seemed to be nearly the same as on the adjoining trees, which were not treated, the fruit on both being less wormy than usual, while in other instances there was a very unusual freedom from the apple worm. Other experimenters claim far more decided results. So promising a measure, where so much is at stake, well deserves a most extensive trial. The mixture should be applied while the fruit is quite small, and before the stem is bent with its weight; then as the eye or calyx of the fruit, on which the codling moth usually deposits her eggs, points upwards, it will more readily catch some portion of the spray. A very minute quantity lodged in the little cavity and drying there would leave a trace of Paris green sufficient to destroy the newly hatched larva as it begins to eat its way into the fruit.

The meeting of the American Association for the Advancement of Science was held this year at Minneapolis, where I had the honor to represent our Society. The attendance of Entomologists, although good, was scarcely so large as last year. Since the adoption of the new constitution, whereby the sub-section of Entomology has been merged into the section of Biology, the Entomologists have greatly felt the need of opportunities of bringing up for informal discussion many questions suggested by the experience of those present, matters which could not well be brought before the general session. To meet this need the Entomological Club of the Association has been re-organized, several interesting meetings were held, the proceedings of which have been reported for the ENTOMOLOGIST.

We have had occasion to mourn the loss by death, during the past year, of several well known Entomologists, some of whom were active members and valued contributors to our journal. The names of Zeller, Glover and Chambers are familiar to you all; these have passed away. Our list also includes the names of Dr. Bailey, of Albany, N. Y., Prof. Croft, late of Toronto, and Charles Arnold, of Paris, Ontario. Prof. P. C. Zeller, the eminent German Lepidopterist, whose labors in the Microlepidoptera have given him a world-wide reputation, died at his home near Stettin at the ripe age of 77 years. Dr. Jas. S. Bailey, of Albany, N. Y.,

a zealous worker among the lepidoptera, and an occasional contributor to the ENTOMOLOGIST, passed away on the 1st of July. Prof. Townend Glover, who for so many years held the position of Entomologist to the Department of Agriculture in Washington, died on the 8th of September. Probably no man ever worked more persistently and continuously than he. A good draughtsman and an excellent engraver, it was his delight to make figures of every native insect brought under his notice. Our library has been enriched by his beautiful works, and the wonder is how any man in one short life could have done so much. His health having failed, he retired several years ago from his official position and active work, and spent his last days in a quiet home in Baltimore. V. T. Chambers, of Covington, Kentucky, one of our most regular and valued contributors, died on the 7th of August in his fifty-second birthday. To him we are largely indebted for the knowledge we possess of our Microlepidoptera, a field in which he ardently labored, and in which he was a worthy successor to the late Dr. Clemens. His loss will be much felt and deplored. Charles Arnold, of Paris, Ont., although not an active worker in the entomological field, was a close observer of the habits of insects, especially such as are injurious to agriculture or horticulture. He has long been a member of our Society; was with us at our annual meeting held here two years ago, and took part in our discussions. He died on the 15th of August in his 66th year. Prof. Croft was well known throughout Canada as an eminent chemist, and always took an active interest in entomology. He had a prominent part in the formation of our Society; was its first President, and always manifested the greatest interest in its prosperity. He died at the residence of his son, San Diego, Texas, after a brief illness, aged 64 years. Who will press forward and fill the vacant places in our ranks? One by one we pass away, but our favorite branch of natural science still lives, and will continue to assert its increasing importance, and confer its benefits on all succeeding generations.

WM. SAUNDERS.

PREPARATORY STAGES OF EPILACHNA BOREALIS, FAB.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Length .06 inch by .02 in width. In shape elliptical, rather narrow. Color dingy yellow, somewhat pulverulent. There were 56 of these found on the under side of a leaf, set on one end and about .05 inch

apart. They were found September 9, 1883, at which time they were hatching, hence the length of the egg period is not known.

Young Larvæ.—Length .06 inch. Color dull yellow, more or less brownish at the ends, the sides of the head distinctly brownish. Each joint bears six branching spines concolorous with the body. In outline somewhat elliptical, the head being nearly as broad as the middle of the body, but the anal joint is not. Length of this period 5 days.

After First Moulting.—Length .10 inch. Shaped much as before, oblong elliptical. Color pale dull yellow, clearer than before the moult. Number of spines the same, about 3 branches to each. Head blackish on the sides. Length of this period 6 days.

After Second Moulting.—Length .20 inch. Shape and branching spines as during the last period, except there are more points to each spine than before, seven counted on one. Ground color yellow, clearer than before moult, eyes blackish yellow, a black spot in the lower part of each, and a spot below the eyes blackish yellow. Legs, except the articulations, smoky yellow. Tips of spines brown. More narrowly elongate than during last period. The length of this period not known, as the food plant died, mostly from attacks of these insects. Before finding the eggs, however, I had taken a description of a mature larva and pupa, as well as pupal period. From what I observed then on the food plant earlier in the season, I know that the principal differences that would have been noted on the stages between the second moult and the mature larva were those of size.

Mature Larva.—Length from .35 to .40 inch. Elliptical in outline, the width and height through the middle of the body .15 inch. Color yellow, each joint with 6 branching spines which are yellow on their basal half, the rest black, there being about 9 branches to each spine. Eyes and ends of tarsi brownish black.

Chrysalis.—Length .35 inch, of an outline similar to the mature larva; yellow, moderately covered with short hairs, black and white mixed. Length of this period 8 days.

Dr. Packard says of this: "The larvæ, according to Osten Sacken, are common on the leaves of the pumpkin. It is yellow, with long, brown, branched spines, arranged in rows of six on each segment, except the first thoracic segment, which has only four." I found them feeding on *Echinocystis Lobata*, or the common prickly cucumber, and found not

only the larvæ, but the beetles, feeding freely on the leaves, showing no disposition to feed on plant lice, the generally acknowledged food of the *Coccinellidæ*. To test this, one of the beetles was placed in a jelly dish with a leaf, upon which it at once went to feeding, and I saw them doing the same thing on the vines. The larvæ in feeding eat the whole of the tissue on the under side of the leaf, except the veins, leaving the upper epidermis. The beetles usually eat this, leaving only the veins.

Assuming the egg period to be 5 days, and the third and fourth larval periods the same as the first and second respectively, we would have a period from the egg to the imago of 35 days, which can not be far from correct. They probably pass the winter in the imago state, as do others of the family.

PSEPHENUS LECONTEI—ON THE EXTERNAL ANATOMY OF THE LARVA.

BY D. S. KELLCOTT, BUFFALO, N. Y.

This singularly interesting larva occurs in abundance in the rapids of the Niagara above the Falls. The writer has taken it in other rapid streams in Western New York, also at different places in Michigan; besides, its occurrence in widely separated localities has been recorded by observers, hence we are led to believe that it is distributed throughout Eastern North America. Dr. Leconte has described another species, *P. haldemanni*, from the peninsula of California; its larva, it seems, has not been described.

The first notice of our larva is that by Dr. Kay in Part VI. (Crustacea), page 53, Zoology of New York, 1844. It is described in that work as a new genus and species of Crustacea, under the name *Fluvicola Herricki*; a poor figure is given. Dr. John L. Leconte, in Agassiz's Lake Superior, page 241, 1850, describes it more exactly; he gives an account of the parts of the mouth; no figures are given. In the proceedings of the Philadelphia Academy of Sciences, Vol. VI., page 41, 1852, the same author has a brief account of the larva, but adds no additional facts. In Dr. Packard's Guide to the Study of Insects, page 450, 1870, the characteristics of the larva are briefly stated, and a figure is given which shows well enough the outline of the insect.

The present paper is intended for a supplement to those already published, while it is believed that in a few instances inaccuracies in them are corrected, and some omissions are supplied; yet it is acknowledged that it is far less complete than it might have been, had full advantage been taken of the material at hand. The dissected parts, particularly those of the mouth organs, which served for the drawings of the figures, have been mounted in balsam for preservation.

The larva of *Psephenus* has been compared with those of *Helichus* and *Elmis*; from the latter it is said to differ in no important particular. Figure 2 of the plate represents a larva supposed to be that of *Helichus lithophilus*, Germ., and is introduced for the purpose of comparison with *Ps. Lecontei* (Fig. 1). The general resemblance is close, some essential differences appear, but no full description of the larva of *Helichus* is at hand for comparison.

The young larva of *Psephenus* is found clinging to stones, the shells of *Unio*, old wood and the like, usually where the flow of water is considerable, often in the wild rapids, yet they have been taken in quiet water along the shore, or even in ponds entirely cut off from flowing water; their flat, disc-like form, concave below, marginal cilia and powerful legs enabling them to resist the swiftest current.

Excluding the head the larva is made up of twelve rings; the body proper is but little broader, relatively, than that of many other Coleopterous larvæ; the shield form is due to an uncommon extension of the tergal folds, *pleurites* of the first ten body rings. The prothoracic segment is broad, and extends over the head like a buckler; it is divided by sutures into six parts; those on either side of the median suture are each divided into two by a suture from near the anterior edge obliquely backwards to near the middle of the posterior border; the external pieces correspond with the pleurites of the following rings (Fig. 1, *a*). The second and third thoracic rings are broad, nearly equal, the expanded plate of the mesothorax is, however, more wedge-shaped than that of the post-thorax, in order that its outer margin may complete the outline curve with the prothorax. The first three rings occupy one half of the expanded surface of the larva.

The seven succeeding abdominal rings have nearly equal length, but gradually diminish in width from the first, the widest part of the body, to the eighth and ninth. These two have nearly equal width. They are, however, considerably longer than the abdominal joints above them. The

terminal joint is thick anteriorly, but posteriorly it becomes membranous, thus agreeing with the pleurites of the anterior rings; the anal opening is situated in the thickened part (Fig. 1, *b*). The abdominal segments from one to seven, like those of the thorax, have each a wide, more or less wedge-shaped lateral expansion; that of the first extends at right angles to the body, but those of the following rings are, more and more, directed backward, that of the seventh being parallel to the line of the body, so that the oval outline of the larva is preserved, although the eighth segment lacks the prolongations. There is a plain suture in the median or dorsal line (Fig. 1, *c*); there is also one dividing each ring at the base of the pleurite (Fig. 1, *d*). These lateral sutures or fissures are more pronounced on the terminal segments. The anterior, free edges of the pleurites bear a few stiff hairs, while the outer edges are furnished with a close-set ample fringe of sub-equal hairs.

The general color is grayish brown; under a lens there are blotches of a darker hue spread over a lighter field; moreover, the whole upper surface is marked with irregular lines of black dots, which appear to be elevations.

"The articulation itself is prolonged each side for a short distance between the laminae of the expanded epidermis, so that the outline of the proper fleshy portion is serrate." The epidermis of the upper surface is somewhat corneous and thick. Figure 4 shows a cross-section of the second abdominal segment. It exhibits the almost uniform arch above and the thin tegument of the ventral surface extending out to form the under surface of the pleurites.

The *head* is not retractile, except in the sense that the upper surface of the prothorax is permanently prolonged over and beyond it. The head is flattened above; the epicranial suture is short, the clypeo-cranial sutures extending well up on the top of the head; they terminate at the place of insertion of the antennae. The suture separating the clypeus from the labrum extends from antennae to antennae (Fig. 5, *c*). There are six ocelli in each group. When mounted as transparent objects, each shows an oval outline, with a clear border surrounding a dark, more or less, oval center. The resemblance to the reptilian blood corpuscle is very close. Five of the ocelli are in a slightly curved line with their longer axes nearly parallel; the sixth is placed at the upper outer angle of the group, with its axis at right angles to those of the others. It is also the largest one of the group (Fig. 9). There is a little patch of hairs between the ocellus and the adjacent suture.

The antennæ are as long as the head, and four-jointed; the first or basal joint is short and stout; the second is cylindrical, or but slightly narrowed at the upper end, nearly straight, and as long as the width of the labium, or a little more than half the length of the whole antennæ; there are a number of long hairs or bristles on the outer side of the distal half of this joint; the third is more slender, slightly more than half the length of the second (Fig. 5, *a*); the fourth joint is represented by two very short articles inserted in the third, so that they resemble a pair of minute forceps; the larger of the two has a cuspidate apex (Fig. 6).

The *labrum* is broad, the anterior margin straight, or slightly rounded, the outer corners convex; the outer third bears a row of rather coarse spines, the two extreme ones being much stouter. The labrum extends beyond and bends down over the mandibles. Its concave under surface is beset with many stiff hairs, some of which extend beyond the margin, forming a fringe. In the front, near the middle of this concave surface, there are eight protuberances; four smaller ones in a group; outside of these, two on either side, are situated the remaining larger ones. These are tooth-like (Fig. 12, *a* and *b*). Beginning back as far as the middle of the mandibles is a corneous strip, which soon divides, the branches extending to the outer angles of the labrum (Fig. 12).

The *mandibles* are large, brown or black towards the tips. Seen from above the outline is triangular; in the younger larvæ these organs are relatively shorter, making the outline more nearly that of an equilateral triangle. The basal edge is slightly convex, and bears just beyond the middle the ball for the articulation of the organ with the elbowed corneous support of the cheeks. (In some examples the ball appears to be situated nearer the outer angle than in others). At the inner angle there is a process and a chitinous piece, apparently articulated with it, to which the tendon of the flexor muscle is attached; the outer angle is somewhat re-entrant; the termination of the extensor muscle appears to be quite similar to that of the flexor; the outer edge is nearly straight, bending inwards a little towards the apex; the inner line is straight to near the middle where it bends in the blade, becoming spoon shaped; the biting edge is evenly rounded. When the organ lies with the inner face uppermost, it is seen that in the basal part there are two laminae not united with each other on their front and posterior edges; at the lower part of the concave part of the blade arise two tufts of hair, the outer one is short and bristle like, the other is long, reaching back and nearly across the throat (Fig. 8).

The *maxilla* are complex; the stout cardinal piece is chitinous, bearing on its surface two sharp hooked teeth; the superior part is divided into two lobes, the outer one is soft and fleshy, rounded at the apex, having its surface beset with long, stiff hairs; the inner one is concave above, and bears at its apex four stout teeth, which have rounded extremities and the inner face concave; along the inner surface of the lobe there are several strong pointed curved spines. The maxillary palpi are four-jointed; the basal joint is short and broad; the remaining articles diminish regularly in diameter; the second and third are about the same length, equal to twice that of the first; the third is rounded at the end, and more than half the length of the fourth. There are apparently several minute tubercles on the rounded surface of the extremity. The same appear on the corresponding joint of the labial palpi (Figs. 5 and 10).

The *labium* extends over the under surface of the jaws nearly to their tips; its texture is membranous; its surface is densely clothed with hairs; the somewhat quadrate mentum is situated between the stout maxillæ. On its outer sides there are two elevated corneous pieces; they each have a pointed, tooth-like upper extremity. A long hair arises from its outer surface. A faint suture divides the anterior or palpi bearing part from the mentum. This piece is as wide as the distance between the maxillæ; the front edge is bisinuate; the labial palpi are situated at the posterior outer angle of this palpigerous piece. They are three-jointed; the first and second are stout, and the terminal one narrower and bent inwards. These organs project a little beyond the anterior edge of the labium (Fig. 11).

The legs are rather long and muscular. The tarsus ends in one strong claw; there are many stiff hairs over the surface. Above the claw there is one long, straight bristle; just above it, on the inside, there is a little tuft of bristles.

The *branchiæ* are situated on the posterior border of the ventral surface of the second, third, fourth, fifth and sixth abdominal rings—five pairs in all. The stout branchial trunk, a short distance above its origin, bends outwards, and bears along its lower surface eleven long filaments, the middle ones are longest. These long white organs are seen waving to and fro continually while the animal is alive. This motion appears to be due to the up and down strokes of the last segment, which repeatedly strikes the water as the tail of a cray fish does when swimming. A large tracheal tube may be traced, on either side, from the posterior border of the eleventh ring forward, over the insertion of the branchiæ, connecting with

them into the thorax (Figs. 4 and 7). No tuft of branchiæ thrust out and withdrawn at will, as in *Helichus*, could be seen, after watching living specimens for hours, and after dissecting many examples. The writer is inclined to think it does not exist, and that respiration is wholly accomplished by the ventral branchiæ.

It may be interesting to note the different sorts of hairs found upon the body and organs. These are, of course, those of the usual pattern common to all parts of the body surface. Found on the antennæ there are long, blade-like hairs, with their edges spined; they occur elsewhere (Fig. 13, *a*.) A modification of this sort is common on the legs, etc. They are short, with the spines finger-like (*b*); another variety is long and irregularly branched, found upon the labium and palpi (*c*); still another form fringes the posterior border of the *pleurites*; they have a short stalk, from the top of which radiate numerous fibres, fan-like (*d*). The hairs of the border fringe are invested in a sheath slightly colored brown. Immersion in potassa removes them from their sockets, leaving the edge of the segment serrate.

EXPLANATION OF THE FIGURES.

Fig. 1.—Larva of *Psephenus Lecontei*, dorsal view, magnified eight times; *a*, suture; *c*, dorsal suture (dotted line should extend further); *d*, suture base of pleurite; *b*, anus.

Fig. 2.—Larva of *Helichus lithophilus*, enlarged eight times; *a*, dorsal stripe; *c*, one of four light spots; *b*, anal tuft of branchiæ, protruded or withdrawn at will.

Fig. 3.—Leg of *Ps. Lecontei* (enlarged).

Fig. 4.—Cross section of second abdominal segment (enlarged); *c*, *c*, pleurites; *b*, *b*, branchiæ.

Fig. 5.—Head (enlarged); *a*, antennæ; *b*, maxillary palpus; *c*, chitinous band on under surface of labrum; *d*, ocellus.

Fig. 6.—Tip of antenna, showing forceps-like terminal joint (enlarged).

Fig. 7.—Branchia.

Fig. 8.—Mandible (enlarged one hundred times); *b*, chitinous support, the cheek articulating with the mandible; *b*, flexor muscle of the jaw; *c*, ball article; *t*, tufts of hairs.

Fig. 9.—Ocelli.

Fig. 10.—Maxilla; *a*, palpus; *b*, inner lobe; *c*, outer fleshy lobe; *d*, cardia; *e*, pointed papilla. Magnified one hundred times.

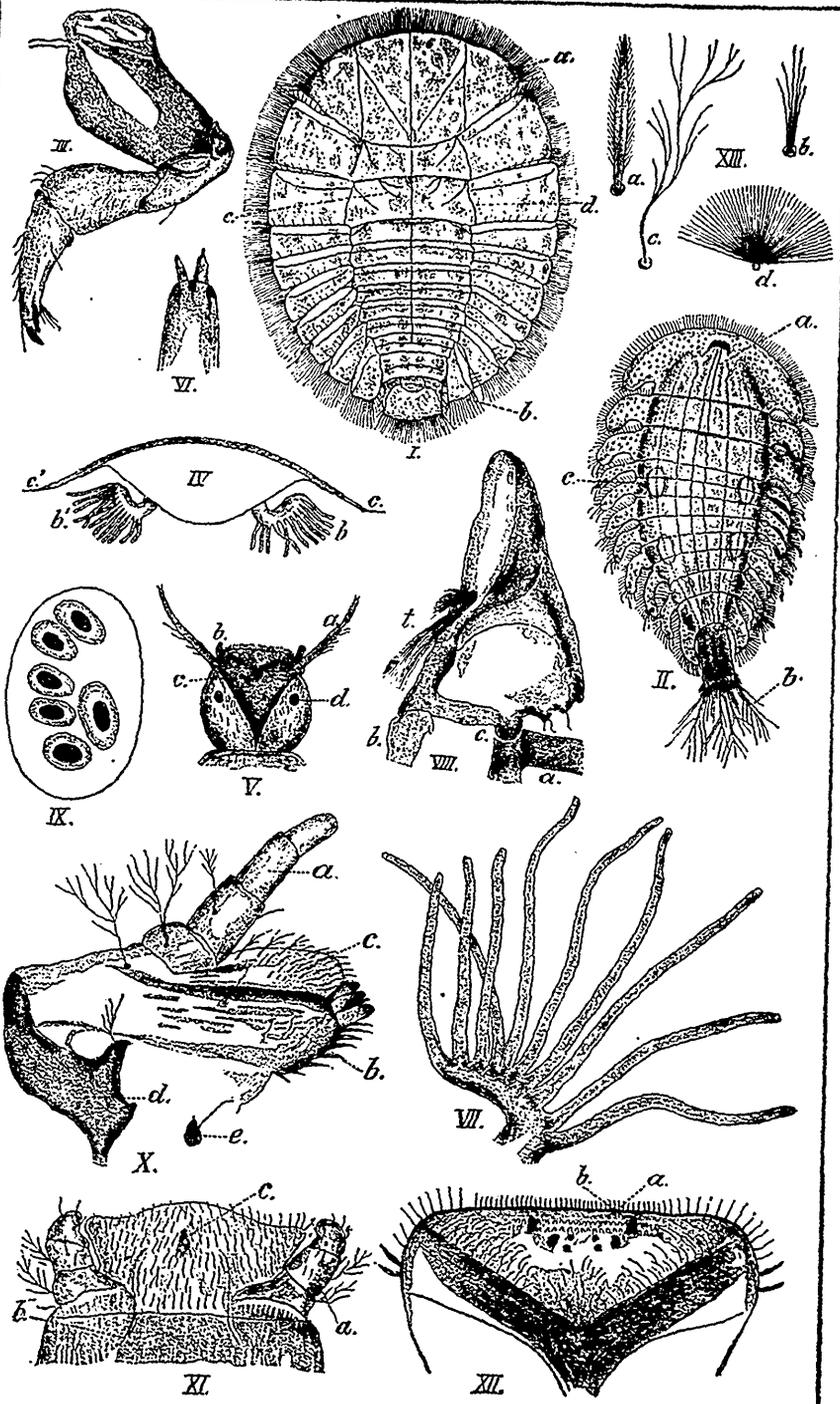


Fig. 11.—Labium; *a*, palpus; *b*, mentum; *c*,

Fig. 12.—Labrum; *a*, four small papillæ; *b*, four strong teeth; *c*, chitinous support. Enlarged one hundred times.

Fig. 13.—Hairs of different types; *a*, from antennæ and elsewhere; *b*, legs, etc.; *c*, palpi; *d*, posterior border of the pleurites.

CORRESPONDENCE.

FURTHER NOTES ON THE PSYLLIDÆ.

If I might judge of the feelings of the readers of the CANADIAN ENTOMOLOGIST by my own, I should say that they were much obliged to Prof. Riley for his note on the Psyllidæ, and for the accompanying illustration. Figure 7 of that illustration is, however, imperfect, in that (1) it fails to show the feet of the insect—an important consideration as regards Westwood's classification; (2) it gives the appearance of the *dried* galls on an apparently fresh leaf: the fresh galls are much more pear-shaped—in many instances they are nearly globular; (3) the section of the gall does not show the hardened inner roof of the cavity or cell.

I hope Mr. Riley will pardon me if I say that he indulges a tendency to be needlessly exact. When I wrote my description (and it proves to be the first description published) of the *Psylla* under our notice, I used the indefinite article *a*. In my subsequent note, when the insect had been distinguished by Prof. Riley's remarks—at any rate, when it was the insect under our consideration, I wrote *the*. The Professor seems to think that the readers of the ENTOMOLOGIST will mistake my meaning. I feel sure that they will not.

With regard to the term *Celtidis*, Endlicher and De Candolle (and the latter is undoubtedly a great name amongst Botanists) could scarcely have known Latin better than Pliny; and one cannot help feeling that, as regards *Celtidis*, they went—well, to use Mr. Mantalini's gentle euphemism, "to the Bow-wows" for their Latinity. The nettle-tree, perhaps, was useful to the Celtic females, as the fig-tree was to Mother Eve; but the tracing of *Celtis*, gen. *Celtis*, to *Keltidos*, genitive of *Keltos*, is indeed

“*Græca obscura*, as Linnæus puts it.” The foreign authors referred to have evidently fallen into error in this matter.

Let us now see what we have before us concerning the Psylla. Mr. Fletcher, in his interesting paper on the Homoptera, in the Society's last report, gives us Prof. Riley's notice of the Flea-lice of the Nettle-tree “in full.” That notice is a mere allusion, a reference to a gall, not a proper description of the insect, as Prof. Riley assures us. The Professor tells us also that *P. venusta* has not been properly described. Osten Sacken's account, supplied to me by a friend, is this: “I raised out of the gall a beautiful large Psylla—*Ps. venusta* n. sp.—with the wings variated with black. The peculiar shape of the apex of the metasternum and the venation of the wings will, perhaps, necessitate to make a new genus for this species.” Mr. Fletcher has shown that the tree, *Celtis occidentalis*, is rare in Lower Canada. When, then, I met with this rare tree, and found *the* undescribed Psylla upon it, I felt justified in sending a description of the insect to the ENTOMOLOGIST. But, really, the tone of Prof. Riley's remarks gives rise, within me, to an uneasy feeling that, somehow, I have been trespassing on the Professor's private preserve of Pachy-psyllids. I can only offer as my excuse that, as Entomologists, we want information. What information have we concerning the Psylla we are considering, apart from my own description, and Mr. Fletcher's admirable account published subsequently? What, beside the illustrations, has Prof. Riley added to our stock? He tells us that he called an insect, already named *P. venusta*, “*P. celtidis-grandis*”; that this insect is very large (Osten Sacken had told us it was large); that there are differences, as regards position and size, between the gall it produces and that produced by *P. celtidis-mamma*; that *P. celtidis-mamma* so closely resembles another species, however, that “without the galls, it would be difficult, if not impossible, to separate them—a not uncommon occurrence among gall-producing species.”

Now, an accidental puncture, by the mother Psylla, of the leaf-stalk, through which the nourishment of the leaf flows, would naturally produce a larger excrescence than a puncture of a vein; and a larger supply of food would as naturally produce a larger insect. We know, to our sorrow and perplexity, that the rage for re-classification, and for raising varieties into species, is becoming a vice on this side the Atlantic. And we really have nothing before us to show that the *P. venusta* of Osten Sacken, and

the *P. celtidis-mamma* of Riley, are not one and the same insect—the Peppered Flea-louse of my own description. They may be very distinct species, but Prof. Riley has not yet made it clear that they are.

THOS. W. FYLES.

Dear Sir,—I write to you in reference to *Sphyracephala brevicornis*, Say; the only representative of the family *Diopidae* and the genus *Sphyracephala* in the United States. This curious and seemingly rare Dipteron was taken by me on the 18th of August last; on that occasion I took three specimens in about five minutes, but had to leave the place as quickly as possible on account of an approaching storm; but, however, I visited the same place two weeks later and succeeded in taking about a dozen specimens in about half an hour. The specimens were taken in Fairmount Park, near the same locality where Say first took his specimens. Although I have been seeking this insect for two seasons, this was the first time I ever saw it, its small size is very apt to make it escape the notice of any general collector. My specimens were caught on some plants growing near a small brook. They seem to be very local indeed, for I have hunted in similar situations over the Park and in the county, but have never seen any except in that one particular spot. *Ochthera mantis* DeG. is also taken in damp situations, but this fly is quite common and can be taken nearly all the summer, for, comparing my notes, I took it on May 7, June 17, during July, August 5 and 12. Hoping my observations may be of some avail to collectors in hunting it, I remain,

Philadelphia, Oct. 8, 1883.

EUGENE L. KEEN.

EGGS OF NEMATUS VENTRICOSUS.

Nematus ventricosus was seen to deposit thirty eggs, June 7, upon a single currant leaf within one hour. In the act of ovipositing, it curved the tip of its abdomen downward and forward, directing its ovipositor toward its head, in which position the end of the egg is seen to protrude and attach itself to the leaf-nervure, when the ovipositor is withdrawn, and the egg left in position. Moving backward a very little, another egg is similarly deposited, and in like manner the operation is continued, until the leaf has its assigned quota, or the supply of eggs is exhausted. The eggs produced their larvæ on June 14th.—*Psyche, May-June, 1883.*