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The Canadian Entomologist.

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ENTOMOLOGY FOR BEGINNERS.

PULVINARIA INNUMERABILIS, RATHVON.

BY THE EDITOR.

This insect, which has commonly been known as the Grape-vine Bark-louse, might with perhaps greater propriety be now designated the Maple-tree Bark-louse, for the reason that it has been more frequently found on maples, and inflicted more injury on these trees, than it has on grape vines. The great abundance of this insect during the past season has called general attention to it and elicited many enquiries in reference to its history and habits; indeed, in many sections of Western Ontario, as well as in the adjoining States of Michigan and New York, it has appeared in such swarms as to endanger the lives of the trees attacked. Branches have been sent to us so thickly covered with the insect in its various stages of growth that they could not be handled without crushing some of the numerous population.

The earliest description of this insect was given by Dr. S. S. Rathvon, of Lancaster, Pa., in 1854, who at that time gave the results of several years' observation on this species, which had occurred in his neighborhood on the Basswood or American Linden trees (*Tilia americana*). He found them to swarm in such countless hosts that he gave the insect the significant name of *innumerabilis*. The late Dr. Fitch next published an account of it in the Transactions of the N. Y. State Agricultural Society for 1859, since which several authors have figured and described this insect; but its life history was not fully unfolded until taken in hand by the late lamented J. D. Putnam, of Davenport, Iowa, who published in 1879, in the Report of the Davenport Academy of Sciences, a most elaborate and complete description of its life history, illustrated with two plates crowded with figures representing the various stages of development, all drawn by himself from nature. To these several publications we are mainly indebted for the facts here presented.

This bark-louse appears first in the form of a brown scale, from which, as it increases in size, there is protruded from the female scale cylindrical white filaments of a waxy nature, in which eggs are laid, and these cotton-like filaments, as new fibres are secreted, are constantly pushed further back until there protrudes a bunch about four times as large as the scale, as shown in fig. 5, which is thickly crowded with eggs. Permeating through the nest is a quantity of powdery matter which under a high magnifying power is seen to be in the form of rings. The waxy filaments are adhesive and elastic, and can be pulled out sometimes a foot or more before entirely separating. When heat is applied these fibres melt, and their waxy nature is further demonstrated by their solubility in ether and chloroform. A single nest will seldom contain less than 500 eggs, and sometimes upwards of 2,000. The female begins to lay eggs in the latter part of May, and continues laying from five to seven weeks, until she dies from exhaustion, her entire life continuing for about thirteen months. During the laying and hatching of the eggs she secretes a quantity of a sweet liquid known as honey-dew, which attracts ants, flies and other insects, and it often happens that the young lice crawl up the legs and bodies of these visitors, by whom they are thus carried to other trees.



Fig. 5.

The newly hatched, yellowish-white lice soon distribute themselves over the branches, and attaching to the succulent portions, pierce the tender bark with their sharp beaks and subsist upon the sap. They shortly become stationary, when they gradually increase in size and finally reach maturity.

The scale of the male insect is very different from the female. It is longer in proportion to its size, and there are no waxy filaments projecting from it. When fully mature the insect escapes from its scaly covering and appears as a minute, beautiful and delicately formed two-winged fly, marked with yellowish and chestnut brown, with brilliant rose-colored wings which also reflect the colors of the rainbow. These flies do not appear until August and September, and their lives in the winged state are very short, not exceeding two or three days.

Besides the Maple and the Grape, these insects are, as already stated, also found on the Linden or Basswood, and sometimes on the Elm.

Where permitted to continue their depredations undisturbed, they weaken and injure, and occasionally destroy the trees attacked. They affect chiefly the under side of the branches and twigs.

REMEDIES.

The branches of the infested trees may be vigorously rubbed with a stiff brush or broom, which will dislodge many of the insects, and then coated with a strong alkaline wash made by melting either soft or hard soap and diluting it to the consistence of paint with a strong solution of washing soda; or they may be destroyed with an emulsion of coal oil made by agitating vigorously and for a considerable time one pint of coal oil with an equal quantity of milk, until the mixture assumes a creamy appearance, when it should be diluted with about ten times its bulk of water and applied with a brush or syringe.

DESCRIPTION OF THE LARVA OF HEMARIS TENUIS, Gr.

BY PH. FISCHER, BUFFALO, N. Y.

Head light green, around which is a ring of bright fine yellow granulations. Body light green whitish at the dorsal region; a whitish subdorsal line on each side running from caudal horn to third segment, also a dorsal green line running from caudal horn to 3rd segment, where they both become indistinct. Under side and legs chocolate brown, prolegs black, with a narrow white band near base. Caudal horn thin, slightly curved forward, flanked at base with bright yellow. Stigmata on first, and from third to tenth segments, dark blue. Length about two inches. Larva finely granulated with white. It is found from middle of June to end of July. Of these, some of the earliest larvæ will, after pupating, hatch within about two weeks, (the balance staying over till next spring) which will deposit their eggs and also grow to maturity towards the latter part of September; so that the larvæ may be found almost continually from June to October. The eggs are small, round and green, and hatch in about ten days; they are found on the under side of the leaves of *Symphoricarpus*, *Lonicera* (different species), and *Triosteum perfoliatum*, its food plants. The color of the larvæ of this latter brood varies considerably, some being a reddish brown with a slight purple tint, the head sometimes being yellow like the ring around it, sometimes brown; others when young are green above and black below, with a black head; others again have the normal color and other characteristics.

PHYTONOMUS PUNCTATUS, FABRICIUS.

The Punctured Clover-leaf Weevil.

BY A. H. KILMAN, RIDGEWAY, ONT.

A curculio new to Canada has appeared in this locality. Prevailing east winds about Aug. 10th wafted this new clover pest to our shores. This beetle, as far as I know, has not been mentioned in the ENTOMOLOGIST. It was introduced from Europe little more than three years ago. Appearing on the eastern seaboard, and taking the continent in the inverse order to the movement of the Colorado Potato Beetle, it is working rapidly westward. Last year no specimens were reported west of Rochester, while in Eastern New York the clover crop was destroyed by this insect. On the date above mentioned it appeared in Buffalo in such numbers that thousands were crushed on the pavements by the feet of passers-by. Simultaneous with this was its appearance in Ridgeway. I picked them from the fences and sidewalks, and found them in the grass on my lawn. Mr. Reinecke could have gathered them by the quart along the lake shore at Buffalo, where they had stranded after being carried by the wind far out upon the water. They have the extraordinary faculty of closing their tracheæ and suspending respiration while in the water, and an hour's sunshine on the sandy beach leaves them none the worse for a good soaking.

The beetle is two-fifths of an inch long, has a stout body of a dark brown color; sides of thorax and elytra dull yellow, a central yellow line on thorax, rows of black raised points along inner half of elytra with dashes of the same muddy yellow towards the rear. Each female has a "depositing power" of from 200 to 300 eggs. She punctures the clover stem and places an egg therein, or sometimes attaches it to the surface of the stem. The larva feeds upon the leaves, which it destroys rapidly, eating only during the night and hiding in the day time.

I am of the opinion that the advance guard of this insect invasion arrived last year, and it is the main body now; and further that those now arriving will go into winter quarters and open up a lively campaign in the spring. I am led to these conclusions by the fact that many clover fields in this and adjoining counties failed this season to blossom fully, the Clover Midge getting the blame. Whatever the sequel may show, we fear

that these invaders will prove of better staying qualities than those who crossed the border in '66, and turned to the right about at Ridgeway, because Canada was not the "clover patch" they were looking for.

LIST OF SYRPHIDÆ TAKEN IN FAIRMOUNT PARK,
PHILADELPHIA, PA., DURING THE SUMMER
OF 1884.

BY E. L. KEEN, PHILADELPHIA, PA.

The species in the following list were taken in Fairmount Park during the past summer, and mainly during May and June, which is the best time for Syrphidæ; then there are some which only appear in the fall months. Of all families of Diptera the Syrphidæ seem to be better represented in the Park than any other families of this order, perhaps with the exception of the Dolichopodidæ. The Syrphidæ seem to prefer damp and somewhat open woods, especially a small wood that has a small rivulet running through, near the border, and where there are patches of May apple, with the sun shining through the trees on the plants. This only applies to some species, for others prefer the borders of woods, fields, etc. I never found many Syrphidæ in a hot and sandy county, for instance like New Jersey, but what it lacks in Syrphidæ it makes up with the Bombylidæ, for last summer I took about ten species of the latter family in one day, while I only took about seven species the whole summer in Fairmount Park.

The present list does not represent all the species found in the Park; it only includes the collecting of the earlier part of the summer, for during the fall months I did little or no collecting.

Paragus bicolor, Fab. Quite common during July and August.

" *tibialis*, Fallen. " " " "

Pipiza femoralis, Loew. Very rare; took one specimen May 3rd near a small creek.

" *albipilosa*, Willist., n. sp. Rare; two specimens May 15th in damp woods.

Chrysogaster nigripes, Loew (= *Orthonera ustulata*, Loew). Not very common.

" *nitida*, Wied. All summer.

- Melanostoma obscura*, Say. Quite common in damp situations.
 " *mellinum*, Linne. Very common in spring.
- Platychirus hyperboreus*, Staeg. Common.
 " *quadratus*, Say. All summer in damp situations.
 " *peltatus*, Meig. Common in spring.
 " *cœrulescens*, Willist. Rare in spring.
- Syrphus abbreviatus*, Zett. May and June.
 " *americanus*, Wied. May and June; very common.
 " *Lesueurii*, Macq. All summer; common.
 " *Ribesii*, Linne. Common.
 " *arcuatus*, var. *lapponicus*, Zett. Rare; took a specimen on April 27th and May 3rd.
 " sp. nov.
- Mesograpta geminata*, Say. All summer; very common.
 " *marginata*, Say " ,not quite so plentiful as the above.
 " *polita*, Say. Quite rare in comparison with the above two species.
- Sphaerophoria cylindrica*, Say. All summer; very plentiful during May and June.
- Allograpta obliqua*, Say. Quite common.
- Xanthogramma emarginata* (Say) Willist. Not very common.
 " *flavipes* (Loew) Willist. Not very rare; took four specimens this year.
- Ascia globosa*, Walk. One specimen Aug. 25; quite rare.
- Sphegina lobata*, Loew. In spring, May 15 and 21, took several specimens in a damp woods; not very common.
 " *Keenii*, Willist., s. nov. In company with *S. lobata*; took this species May 21; very rare.
- Ocyptamus fuscipennis*, Say. All summer, very common.
- Baccha aurinota*, Walk. Quite rare; took only one specimen in July.
 " *Keenii*, Willist., sp. nov. Very rare; took this species in a path going through an open woods.
- Rhingia nasica*, Say. Very common in both sexes in woods.
- Eristalis aeneus*, Scop. All summer; commonest of all the species of *Eristalis*.
 " *Bastardi*, Macq. Quite common during June.
 " *dimidiatus*, Wied. Not rare; June and July.
 " *tenax*, Linne. Very common all summer.

- Eristalis transversus*, Wied. All summer.
 " *Brousii*, Willist. June; very common last year; only took two specimens this summer.
Helophilus similis, Macq. Quite common.
 " *latifrons*, Loew. "
Pterallastes thoracicus, Loew. Not very plentiful; only two or three specimens are generally taken during a season.
Mallota posticata (Fabr.) Willist. Quite common.
 " *Bautias*, Walk. Quite common.
Tropidia quadrata, Say. In damp and shady situations; common.
Criorrhina analis, Macq. Common in woods during May and June.
 " *intersistens* (Walk.) Willist. Very rare; took three specimens May 23rd in a woods.
Brachypalpus frontosus, Loew. Very rare; I reared this species from a larva which I found between some loose bark on a stump of a tree.
Sericomyia limbipennis, Macq. Common in woods during spring and fall.
Xylota ejuncida, Say. Common.
 " *angustiventris*, Loew. Not very common.
 " *pigra*, Fab. Not very common in this locality.
Syritta pipiens, Linne. All summer; this is about the commonest of all Syrphidæ.
Somula decora, Macq. In spring and fall in woods; quite common.
Spilomyia longicornis, Loew. In September; not very plentiful.
Temnostoma alternans, Loew. In spring in woods; rare.
 " *bombylans*. Quite common during May.
 " *pictulum*, Willist., sp. nov. June; very rare.
Milesia ornata, Fabr. August; rare.

 SYNONYMICAL NOTES.

BY GEO. H. HORN, M. D., PHILADELPHIA, PA.

LAMESIS Westw. Tijdschr. voor Entom. xxvi., p. 67. I would call attention to the possible identity of this genus and *Xenorhipis* Lec. The figure given by Westwood (pl. 3, fig. 8) certainly bears a very close

resemblance to that published by me of *Xenorhipis* (Trans. Am. Ent. Soc. 1882, pl. iv., fig. 7, 8). If the two should prove identical, the name given by LeConte (Proc. Acad. 1866, p. 384) should have priority.

L. suturalis Westw. occurs at Cordova, Argentine Republic.

Cyrtophorus gibbulus Lec. (niger † Lec.) On examining this insect with Dr. LeConte, we were convinced that it does not differ in any respect from *Microclytus gazellula* Hald.

Leptura coccinea Lec. After refreshing my memory by a glance at the type in Mr. Ulke's cabinet, I visited the Agricultural Department and from force of habit glanced over the plates of Ratzeburg's Forst-Insecten, and I at once recognised a great similarity between my mental image of *coccinea* and *rubrotestacea*. On comparisons being made by Messrs. Ulke and Schwarz, the two were found identical. As the specimen was reported to Mr. Ulke probably in error as from California, the name should be placed as a synonym of *testacea* Linn. (= *rubrotestacea* Ill.) and dropped from our lists.

L. atrata Lec. After a careful examination of the very old unique in the cabinet of Dr. LeConte, the latter agreed with me that it was a specimen of *proxima* in which the customary black tip had extended, covering the whole elytra.

THE ASH SAW-FLY (*Selandria barda* Say).*

BY HERBERT OSBORNE, AMES, IOWA.

Allantus barda, Say. Bost. Jour. 1 (1835) 218. 7.

Selandria barda, Norton. Bost. Proc., viii., 220, 3.

" " " Proc. Ent. Soc. Phila., iii., 9, 14.

" " Cresson " " " iv., 244, 1.

" " Norton, Trans. Am. Ent. Soc., i., 247, 4.

During the summer of 1882 a few of the ash trees on the college lawn became infested with a Saw-fly worm which for a few days threatened to be quite serious. I made a few trials of London purple on the trees most seriously infested, but before I had gained results from many trees or had completed a study of the larvæ, they suddenly disappeared. So

* Reprinted from Bulletin of the Iowa Agricultural College, from the Department of Entomology, 1884, No. 2.

far as my experiments went they showed the London Purple to be a successful remedy and as applicable to these worms as to any of the Saw-Fly group. No adults were observed, and none of the larvæ I had under my observation matured; so the matter necessarily came to a rest.

During the summer of 1883 the worms appeared in much greater numbers and distributed over many more trees. At the same time and upon the same trees with these worms I observed adult Saw-Flies that I could have little doubt were the mature worms, although I did not succeed in finding the eggs and obtaining the larvæ from them, nor have I reared them as yet from the immature stage. Their presence in large numbers at the time when newly hatched larvæ were appearing plentifully day after day, and the fact that the adult *must* be an insect of this particular kind, left little doubt as to their connection. During the present season I have observed these adults as early as April 15th, and the larvæ but little later, while the eggs from which the larvæ hatch were found deposited in the petiole of the leaf.

The adults are the *Selandria barda* of Say,* the food plant of which, so far as I can find, has never been recorded.

No account of the larva or of its work is given in any of the works that I have been able to consult, and as it seems to me of too much importance to remain unnoticed, I venture to give what I know of its history with the practical results of my study, notwithstanding the doubt that rests over some parts of its life history. The pressure of other duties at the time these worms were at work prevented me from giving them the time they certainly deserved.

LIFE HISTORY.

The eggs are deposited in rows along the sides of the petiole just beneath the outer bark, and so neatly that it is almost impossible to detect any break in the epidermis. Usually there are from six to ten on a leaf. They evidently increase much in size before hatching, pushing the bark up in a blister-like elevation, and if cut out of their covering are found to be very soft, the outer membrane exceedingly delicate and easily ruptured.

* In order to be certain that my determination of the species was correct, I sent specimens to Mr. E. T. Cresson, of Philadelphia, and he has kindly compared them with the specimens in the collection of the Am. Ent. Soc., and pronounces them identical, except a slight difference in size.

The larvae are evidently hatched within two or three days after the eggs are deposited, and are at first slender, whitish worms with black heads and thoracic legs. They crawl at once to the leaflets and appear to select the more tender ones for the commencement of their work. They grow quite rapidly and reach the first moult on the third or fourth day. Before moulting they are more whitish in color, and the head particularly loses its ordinary color. After the moult the head is jet black and glistens like a glass bead; the six thoracic legs have also the same jet black color; otherwise the larva is clear green with a slightly darker dorsal line. There

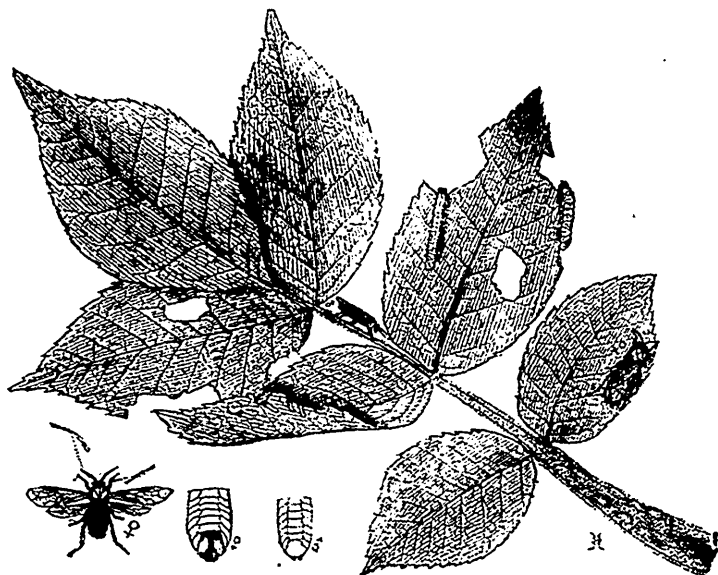


Fig. 6.—*Scandria barda* (Say). Leaf of ash showing position of eggs in petiole and work of larvæ.

are seven pairs of pro-legs or false legs along the abdomen and one pair at the tail end. The body is not hairy, neither is it slimy as in some members of this genus, but the skin is somewhat wrinkled.

The worms are mostly found adhering to the under surface of the leaves, and forming a coil, though sometimes extended, especially when feeding, and as they eat away the entire leaf, cutting away at the edges or at the holes entirely through the leaf, they obtain any poisonous substance sprinkled or dusted on the upper surface.

When young they usually keep pretty well clustered together or on the same leaf, but later scatter quite generally, the early clustering being due no doubt to the eggs being laid near together and on the same leaf. The worms moult at least three or four times before reaching maturity.

The worms leave the trees before entering the chrysalis stage, and while I have not succeeded in tracing this stage, it is reasonably certain that it is passed under ground, or at least below the surface mould. It is quite certain also that the winter is passed in the chrysalis stage.

The imago has been observed abundant from April 15th till into the month of May, and also in the month of June. Whether these are two distinct broods or simply the result of great irregularity in appearance, I cannot say. It is certainly possible, however, considering the time that the first larvæ require to attain their growth that they may pupate and issue as a second brood in the month of June. These adults are black throughout, except the upper part of the thorax, which is honey yellow or sometimes orange or reddish, the amount as well as the shade differing somewhat in different individuals. The males are more slender and shorter than the females. In some specimens the front legs are partially yellowish.

They appear to be most active during the heat of the day, and can be caught without much difficulty in the hand during cool evenings.

PARASITES.

Tachina Flies. On trees where these worms were plenty I observed numerous specimens of the friendly Tachinas, and I also found their eggs on great numbers of the worms. So numerous were they indeed that I felt that the worms could safely be left to their attention.

Ichneumon Fly. A small *Ichneumon* occurred also in pretty good numbers, and though I obtained no direct evidence of their preying upon the worms, the habits of the Ichneumons are so well known that there can be little doubt of the meaning of their presence.

The Spined Soldier Bug (Arma spinosa) was observed with the Ash worms impaled on its beak, so it can be counted upon to assist in destroying them.

REMEDIES.

London Purple. The trials I made with this substance proved that it is deadly to these insects, and where it can be used without too great

expense, it may be considered a certain remedy. On all small shade trees it can be applied as readily as to orchard trees, and even on trees of considerable height a good force pump will suffice to thoroughly sprinkle the leaves.

Hellebore is also very effective for these and other Saw-fly larvæ, but as it is no better than the preceding and much more expensive, there is no need of considering it here.

Arsenic may be used in solution like London Purple, but must be boiled to dissolve it.

REMARKS ON THE FAMILY BOMBYCIDÆ.

BY G. J. BOWLES, MONTREAL.

In the American classification of the Lepidoptera, the Bombycidæ occupy a place between the Zygænidæ and the Noctuidæ. They include a large number of genera and species, and are well represented on this continent. The principal characteristic of the family is that from which it derives its name of Bombycidæ,—or spinners,—the power the caterpillars have of producing a silken fibre, which they use in spinning a cocoon in which to pass the pupa stage of their existence. The Silk-worm moth, *Bombyx mori*, is the typical species of the family. Some genera, however, do not produce silk in any quantity. They are also remarkable as a family for the imperfectly developed mouth parts in the perfect insect. In nearly all of them the tongue is short, and in some species wanting, and the other parts of the mouth so imperfect that it is not probable the insects feed at all in the perfect state.

As the family now stands in our classification, it not only comprises genera and species of very dissimilar habits, but also includes insects of many sizes, ranging from small to very large. The largest moths in America belong to the Bombycidæ. It also includes various forms, some very low in the scale. The great majority of the larvæ live on the leaves of plants, principally of trees, but some are root feeders, and others bore even into the solid wood. There are probably no other larvæ that enjoy such a range of food plants as some of the Bombycidæ. To some species almost anything in the shape of a green leaf is acceptable and nourishing food, and they are consequently among the commonest of our moths. Others again are restricted to a single plant.

Some of our finest moths, both as regards size and beauty of form and decoration, belong to this family, while it includes many small and plainly colored insects, some of which have females which never possess wings, and never move away from the cocoons in which they have passed through the pupa state.

These facts seem to show that, the Bombycidae, as classified in America, are rather a heterogeneous collection of insects, whose claims to be included in one family are open to question. Packard, whose synopsis is the best so far published, divides it into the following sub-families; some of these, however, in Europe are given the family rank.

LITHOSINÆ. All small moths, with the wings finely scaled, and generally day-fliers. *Lithosia*, the typical genus, is but poorly represented in Eastern America, there being only one or two species found here, while fourteen are found in England alone. The larvæ of this genus usually feed on lichens. To this sub-family belong the *Crocotas*, also *Euphanessa mendica* and *Deiopeia bella*. The caterpillars are generally a little hairy, and most of the species spin thin silken cocoons.

ARCTIIDÆ. A large and well known group. The moths are of medium size, and some of them beautifully colored, hence their common name of Tiger Moths. Caterpillars generally very hairy, and make soft cocoons, in which they interweave their hairs with silk. Their supply of the latter is not large. The principal genera are *Arctia*, *Spilosoma*, *Callimorpha*, *Hyphantria*, &c. Some of the larvæ are injurious to fruit trees.

DASYCHIRÆ. The Liparidæ of European authors. Packard restricts this sub-family to *Orgyia*, and a few other genera. The caterpillars of *Orgyia* are highly ornamented, and spin thin silken cocoons. The female moths are wingless.

COCHLIDIÆ. Cochliopodidæ of Europe. Small moths with curious slug-like larvæ, which spin cocoons almost globular in form, and of a gluey appearance, the silk being more of a gum than a fibre. This sub-family has some fourteen genera and twenty-eight species in Packard's Synopsis, but only a few of them are found in Canada.

PSYCHIDÆ. A small group of diminutive moths, not found in the Eastern States or Canada. They are closely related to the preceding sub-family.

PTILODONTES. A numerous sub-family, answering as a whole to the *Cuspidates* of Newman's British Moths, although the larvæ of some of our

species do not resemble those of the latter family. The caterpillars of the *Cuspidates* are singular in form, many of them being without anal prolegs, and others being bifid at that extremity. Very few American species have this formation, but some of them are humped, and are otherwise of uncommon shape, while others have the cuspidate habit of raising the anal extremity in the air while feeding or moving about. The sub-family includes the well known genera, *Ichthyura*, *Datana*, *Notodonta*, *Cerura* and others.

PLATYPTERICIDÆ. This division is included in the European family *Cuspidates*. The moths are small, and all have falcate or hooked wings. In England the caterpillars of these moths are not hairy, but are marked with colored lines and spots, and some are without anal prolegs.

ATTACI. Comprises our largest and most beautiful moths, as well as those which produce the best and most plentiful supply of silk. Both moths and larvæ are well known.

CERATOCAMPIDÆ. The genera *Dryocampa*, *Hyperchiria*, *Anisota* and others belong to this sub-family of large and handsome moths. Some of the larvæ make no cocoons, but bury themselves in the earth like the Sphingidæ, and there become pupæ.

LACHNEIDES. Includes *Gastropacha*, *Clisiocampa* and *Tolyte*, moths of medium or small size, with hairy bodies. The larvæ are smooth, with few hairs, and spin slight cocoons of silken fibre.

HEPIALIDÆ. A group of wood or root-boring moths, some of which are large and robust, others small and delicate in appearance.

A glance at the foregoing sketch will show the variety of insects we include in this family, and also the widely differing habits of the larvæ. And it is both curious and interesting to note the analogies which many of the species bear to the other divisions of the Lepidoptera, and even to the other orders of insects. In some cases the resemblance is so close that it is doubtful whether the species is rightly placed, and we might be justified in removing it to some other family of moths, perhaps a long way from the Bombycidæ. Thus in the first sub-family, the Lithosiinæ, the genus *Crambidia* very much resembles the genus *Crambus* among the Tineidæ. *Euphanessa mendica* is very like a Geometer, not only in the perfect state, but also as a larva, as stated by Mr. Saunders, who calls it a "true looper." In a classification based on larval characteristics, this moth would therefore be ranked with the Geometridæ. *Crocota ferru-*

ginosa is a well known species of this sub-family, and might also be taken for a Geometer. I have captured it flying in the sunshine, in company with *Nemoria*, a small Geometer which much resembles it in form, but is different in size and color. *Ferruginosa* does not make a cocoon, the chrysalis being found under stones, with the larval skin generally adhering to its extremity. In the sub-family Cochlidæ, one of the genera is named *Tortricidia*, from the great resemblance of the moths to those of *Tortrix*, they having narrow wings, slender bodies and filiform antennæ. The Psychidæ also contains some remarkable species. The genus *Phryganidia* has many analogies with the Phryganidæ, a group of water-flies in the Neuroptera, not only in appearance, but even in the neurulation of the wings, according to Packard. A European species of this sub-family, *Psyche helix*, has been known to produce young from eggs not fertilized by the male. The larva lives in a case made of grains of sand arranged in the form of a snail shell, thus resembling the Phryganidæ in habits, as it also does in structure.

The sub-family Ptilodontes includes moths which are very easily mistaken for Noctuas. Indeed in some instances it is almost impossible to tell the difference, and, *vice versa*, there are moths classed among the Noctuidæ which, in the opinion of first-rate judges, should be ranked with this family. The first division of the Noctuas is styled the Bombyciæ or Bombycoides, from the resemblance of the insects to the Bombycidæ, not only in the perfect, but in the larva state. *Acronycta* is very like *Heterocampa* and the kindred genera in the Bombycidæ. The colors are similar and the larvæ are hairy, like those of *Arctia*. I notice in the *American Entomologist* for 1880, page 49, that these facts have engaged the attention of Mr. Butler, a high English authority, who communicated a paper to the London Entomological Society on the subject, illustrated by an exhibition of preserved larvæ from the collection of Lord Walsingham. He analyzed the genus *Acronycta*, as represented in England, with the following result: *Rumicis* and *auricoma* should be transferred to the Arctiidæ; *leporina* and *aceris* to the Liparidæ; *megacephala*, *psi*, *tridens*, *strigosa*, etc., to the Notodontidæ, leaving only *alni* and *ligustri* among the Noctuas. If the life history of our *Acronyctas* were worked up, and their larvæ all known, it would be an interesting task to trace the similarities of the species to the Bombycidæ, and might result in equally remarkable conclusions. One suggestive case might be mentioned. The larva of *Apatela* (or *Acronycta*) *Americana* is a large, woolly, yellowish caterpillar

with long slender pencils of black hairs. There is a Bombycid moth found in the Eastern States, *Apatelodes torrefacta*, whose larva, judging from Smith & Abbot's drawing, bears a striking resemblance to that of *Apatela americana*. It is also a large moth, and the two may be more closely connected than is at present admitted. One of them is placed in the Noctuidæ, the other in the Bombycidæ, with a number of genera between. The larvæ of the Noctuan genera before *Acronycta*, in their bizarre appearance, also resemble those of the Ptilodontes more than those of the Noctuidæ. Newman states that *Ichthyura (Clostera)* is closely allied to *Cymatophora*, a Noctuid genus, and should be placed near it in a natural classification.

In the small and beautiful sub-family Platyptricidæ, the moths are very like Geometers, their bodies being slender and the wings broad and finely scaled. They also rest with their wings expanded, as many Geometers do.

The last sub-family in the Bombycidæ is so different from the rest in structure, appearance and habits, that it should be separated from them and given the family rank, as in England. These insects, the Hepialidæ, are borers, the larvæ living either in the roots or the stems of plants, and although they make cocoons, these are hidden in the earth or the stem of the plant in which they have fed. In their structure the perfect insects resemble Neuroptera. The body is long and soft, the antennæ small, and the places of attachment of the fore and hind wings to the body widely separated, as in Dragon Flies and other aquatic insects. Both larva and pupa are also different in form from those of the remainder of the Bombycidæ.

The foregoing notes go far to prove that our Family Bombycidæ is at present too comprehensive. A future revision should raise a few of its subdivisions to family rank, which would make the classification more simple and more natural.

BOOK NOTICES.

Ottawa Field Naturalists' Club—Transactions No. 5 (Volume II., No. 1).

The Transactions of this active Club have just been received, and bear testimony to the value of the scientific work which is being done by our Ottawa friends. The number consists of 152 pages, is well printed

and has been carefully edited. We are glad to learn from the report of the Council that the annual membership has steadily continued to increase from the inception of the Society in 1878, and now is 128. Several valuable papers in different branches of natural history which were read during the winter of 1883-4, have been printed, among which we find a capital and very appropriate Inaugural Address from the President, Dr. H. Beaumont Small, in which the history of the Club is briefly sketched and present events of immediate interest to the Club referred to, after which the different systems of classification in the animal kingdom are treated of. There are tables given of the different systems of Linnæus, Dawson, Cuvier and Haeckel. The President states that the system taught by Principal Dawson (of McGill College) is included as he is our leading Canadian authority, and his system is a fair example of many in vogue at the present day. This is followed by "Notes on the Flora Ottawaensis," which specially refers to introduced plants. Prof. Macoun contributes a paper upon "Edible and Poisonous Fungi." This is followed by perhaps the most valuable paper of all, "A List of Ottawa Coleoptera," by our esteemed correspondent, Mr. W. Hague Harrington. This list shows not only great care on the part of the author in preparing it, but remarkable diligence and assiduity in making the collection of which it is a record, all of which are available for reference. The list contains no less than 1,003 species, 110 of which are new to Canada; all of these were collected within a radius of 12 miles from the City of Ottawa, chiefly by Mr. Harrington himself. This list is remarkably free from errors, and unusual care has evidently been taken to have the nomenclature correct and all synonyms eliminated. Altogether this list forms an important addition to our entomological literature. Following this is a paper by Mr. J. B. Tyrrell upon Suctoria. This gentleman has by taking up the systematic study of these insects and the Acaridæ, already done important work in Canadian entomology. It is upon these tribes particularly that the student has difficulty in finding information. A paper upon Canadian Phosphates by Dr. G. M. Dawson will be read with interest by many. There are also papers on the Fossils from the vicinity of Ottawa, by Mr. Henri Ami; on the Sand Plains of the Ottawa, by Mr. E. Odburn; and the Deer of the Ottawa Valley, by Mr. W. P. Lett. These papers are followed by the reports from the leaders in the several branches of Geology, Botany, Conchology, Entomology, Ornithology and Zoology. The plan adopted in this Club of having the work divided up

into separate branches under leaders, who are responsible for the successful working of the department under their charge, is an excellent one, and might be copied with advantage by other similar organizations.

Seventh Yearly Report on Injurious Insects in England ; by Eleanor A. Ormerod, pp. 98, 8vo., London, 1884.

It is always a pleasure to read Miss Ormerod's reports ; but that for 1883, which has just come to hand, is of particular interest to all engaged in the study of injurious insects in Canada, from the fact that it treats of many of the same and closely allied species which are now attracting attention in North America by their depredations. During the past season an enormous amount of damage has been done to our crops by the Fly-maggots, or the larvæ of Diptera. Unhappily very little is known of the life histories of these insects. Miss Ormerod is one of the few who have done valuable work in this line, and she is still directing special attention to them ; she asks for information and records of observations which may elucidate some of the unknown stages of their existence. A suggestive fact is drawn attention to, in the presence of the grubs of various kinds which infest root and other farm crops, being also found in manure, and thus carted on to the fields. This important discovery opens up a new sphere where valuable work may be done by Canadian economic entomologists and agriculturists. On this continent undoubtedly one of the chief causes for excessively severe attacks by insects is the abundant food supply provided by the large areas of the same crop under cultivation at one time, and our insect visitations have, from this cause, been generally more disastrous than in Europe ; we have thus the advantage (perhaps somewhat doubtful) of greater opportunities for thoroughly investigating them. There is no doubt that interesting results will follow if the same insect be simultaneously examined in America and Europe, and exact notes be taken of all the different stages for subsequent comparison.

A fact which must have struck every one as peculiar is the small amount of systematic work which has been done in Europe, and particularly in England, in the study of injurious insects. With the exception of the Phylloxera in France, no investigations of any importance are recorded until the last few years. Curtis's magnificent work, "Farm Insects," is of course known to all, and until Miss Ormerod began her series of yearly reports, was the only work the farmer had to refer to, and even this from its price was inaccessible to many who needed it most.

These reports are issued annually at a very low figure (the present one being one shilling and sixpence) and are besides forwarded free to all contributors. In them is given a record of the insects which have been most noticeable during the period which each one covers, and together with a plain and easy description of each species, and figures of many, precise instructions are given as to the best remedies and the means of employing them. The talented authoress must be congratulated on the skill she has displayed in treating her subject. While scientific exactness and precision have been maintained, the different insects have been described in such a manner that any agriculturist into whose hands the reports may come will be able to recognise his insect foes with ease. The knowledge accumulated during the previous year is arranged under the heads of the different plants infested, after the same convenient plan as that followed by our worthy President in his invaluable work, "Insects Injurious to Fruits."

In the report before us we have an account of observations on insects attacking the apple and pear, the cabbage and turnip, with special mention of some *Anthomyians*, from which we also suffer, and concerning which it would appear that the attack is worst where rank, fresh farm manure is used, and that the best remedy is gas-lime. We then have carrot and celery insects, also a long account of the pests attacking cereals and grasses, of which the Crane Flies (*Tipulæ*) seem to have been the worst depredators, followed by the Wheat Midge (*C. tritici*) and Wire Worms (*Elateridæ*). Some insects which more or less attack the gooseberry, raspberry and strawberry, are treated of, and under mangold wurzel we find an account of the Beet Fly, *Anthomyia Betæ*, which has been very prevalent in Canada during the past season, attacking the leaves of the beet-root by burrowing large unsightly burrows beneath the epidermis. Under onion we find an account of another of our too well known enemies, the Onion Fly (*A. ceparum*), and the simple remedy of keeping the bulb well covered by earthing up is recommended. The Hop Aphis, which has been the cause of very heavy expenditure in England during the past summer, is treated separately in an appendix which had been distributed sooner than the general report, so as to elicit as much information as possible at the time when it would be most useful. In addition to the above there are articles on False Wire Worms (*Julidæ*), which had been found injurious to beans; and on Slugs (*Limacidæ*), which eat everything, and lastly, there is an attack on that poor, but self-assertive scape-goat, the English Sparrow.

Although it is acknowledged by all that the quality and quantity of the agricultural produce of any country is an enormous influence affecting its prosperity as a whole, and notwithstanding that there is no cause which so materially lessens this supply as the ravages of noxious insects, yet we cannot find that the English Government has done anything to encourage or foster this or similar efforts, even though there are such vast interests at stake. It is, however, pleasing to find in the preface to the report under consideration, an account of an important experiment which has been tried at Aldersey Grammar School, situated in the heart of an agricultural district in the County of Cheshire, as to the possibility of teaching boys as much entomology as is needed for common farm use, without interfering with their other studies. This experiment has now been tried for three years, under the efficient direction of the Head Master, Mr. W. Bailey, with the co-operation of Miss Ormerod, and the results have been most satisfactory. The boys received a course of lessons on insect life, illustrated by living specimens and diagrams; they also collected and bred, so as to watch through their different stages the injurious insects of the neighborhood, and by this means soon became acquainted with the common types. "In fact, *the* great step was made; by the simple but sound method of teaching pursued, the boys had learnt to know *the crop pests* by sight, without doubt or mental worry, just as they knew *the crops* that the insects infest."

J. FLETCHER.

Montreal Horticultural Society, Ninth Annual Report, pp. 154, 8vo., Montreal, 1884.

This pamphlet contains much interesting and valuable information for horticulturists. "Notes on the Trees and Shrubs of Northern Japan," by Prof. D. P. Penhallow, gives a list of the most useful trees of those islands and compares them with some of our own species, with a view to suggesting which might be successfully cultivated in Canada. A most important paper is contributed by Mr. Chas. Gibb on the Russian apples imported by the U. S. Dept. of Agriculture in 1870. Descriptions, and in many cases, good illustrations, are given of the best sorts of these valuable apples, and Mr. Gibb here supplies that authoritative information which is needed in reference to those Russian apples likely to prove suitable to our climate. "The Cultivation of the Cabbage," by Mr. R. Brodie, jr., gives the best varieties, and the best way to grow them on the Island of Montreal. In addition to these papers, there are reports from judges and from four local branches of the Society.