

SOME RECENT IMMIGRANTS INTO NEW JERSEY.
(See page 293.)

The Canadian Entomologist.

Vol. XLIX.

LONDON, SEPTEMBER, 1917

No. 9

POPULAR AND PRACTICAL ENTOMOLOGY.

UNDESIRABLE INSECT IMMIGRATION INTO NEW JERSEY.

BY HARRY B. WEISS, NEW JERSEY DEPARTMENT OF AGRICULTURE,
NEW BRUNSWICK, N.J.

From Europe, Asia and South America, a more or less constant stream of such undesirables arrives and settles in New Jersey. This State by reason of certain specialized agricultural activities, receives more than other States, but what is happening in New Jersey is happening to a less extent in other States. This emigration is not due to the pressure of over-population at home, nor to the pursuit of wealth, nor to political, social or religious discontent. It is rather an involuntary emigration or one of which the participants are wholly unconscious.

European officials try to keep them at home because they know that the United States does not want them, and a small army of inspectors on this side of the water is constantly on the watch for them, ready to turn them back if discovered; but in spite of the combined efforts of these officials, in spite of legislation against them, rules, regulations and so forth, some of these creatures contrive to slip through silently and unobserved, remaining so until later when their unwelcome activities are forced upon the community where they have settled.

On account of the similarity between the climate of this country and the northern parts of Europe and Asia and by reason of other similar conditions, many of these emigrants do very well in this country, especially when allowed to develop to their fullest extent unhampered by enemies and restrictions. One which is comparatively unimportant in its own country may become a serious menace when placed under new and favourable conditions. Fully one-half of the principal injurious hexapods in the United States have been introduced from foreign countries and the injuries inflicted by them have been enormous, in many cases beyond

reasonable calculation. In order to arrive at a better understanding of the facts surrounding these immigrants, a few cases are taken up in detail.

The Case of *Gryllotalpa gryllotalpa* (L.).

(Pl. XIV, fig. 2).

The Mole Cricket, *Gryllotalpa gryllotalpa* (L.), came to New Jersey from Holland, where with other members of her species, she occupied her time excavating tunnels through the soil, feeding on insect larvæ, cutting off plant roots in her path, raising a large family of children, eating them when other food was scarce, and incidently making a nuisance of herself to Holland agriculturists. One day while she and her husband were resting in a tunnel beneath a rhododendron growing in a nursery, the plant was suddenly dug up and before they could run, they found themselves imprisoned by a piece of burlap wrapped around the roots. Too frightened to try to escape, they dug a passageway for themselves in the closely packed soil and awaited developments.

This plant together with others was placed in a huge box which was floated down a canal in a flat-bottomed barge until an ocean-going steamer was reached. Here it was loaded none too gently into the hold of the vessel, which in due time docked at Hoboken, New Jersey. Following this, the case was loaded on a freight car and finally reached its destination in that state. Here the plant was removed, the burlap around the roots loosened, and the whole thing planted. Finding themselves free at last, Mr. and Mrs. *Gryllotalpa* crawled out to investigate and found conditions pretty much the same as they had been before their rough experience. So these two "shanghaied" creatures started a sub-way right then and there, and in due time raised another family. During the next few years they flourished exceedingly well, increasing in numbers by leaps and bounds, and finally cutting off so many roots that the plants wilted and died and the owner called in an entomologist to suggest a remedy.

And so ends the case of *Gryllotalpa*. Of course, the plants were officially inspected before the owner was allowed to plant them, but the inspector never thought of looking in the soil around the roots. If he did, he decided that it was not practical on ac-

count of the length of time necessary for such an operation, or because of the fact that the roots of the rhododendron were so fine and fibrous and so imbedded in the soil that it would be impossible to separate them and have anything left that would grow.

Some persons say that *Gryllotalpa* will never amount to much in New Jersey, which may be true, but what is to prevent her from being carried to other parts of the United States just as she was brought to New Jersey? Anyhow, she has a bad reputation in Europe.

The Case of *Blaberus discoidalis*.

(Pl. XIV, fig. 1).

Just like *Gryllotalpa*, the large Cockroach, *Blaberus*, came to New Jersey in a boat, but in this case, the boat sailed from a South American port instead of an European one. This boat carried among other things, numerous cases of wild orchids, which were consigned to a New Jersey orchid grower. It is somewhat difficult to determine just when *Blaberus* and his associates crawled into these cases and why they wanted to come to New Jersey. Perhaps they were chasing each other around the boxes while they stood on the dock of a South American port and a few dodged in to hide and were later carried on board. Perhaps they were already on the ship and crawled in the boxes for green food or want of something better to do or in search of amusement. However, these cases of orchids finally stood outside of a greenhouse in New Jersey waiting to be unpacked. This work was done outside so that *Blaberus* could not get into the house and thrive.

The official inspector was there also but *Blaberus* knew naught of inspectors and regulations and when the plant in which he was hiding was picked up, quick as a flash he dropped to the ground and scooted off. The greenhouse man said, "Well he will die just as soon as the weather gets cold, anyhow." Did he? Well, I guess not. Just as if an intelligent roach couldn't find a crack in a greenhouse, large enough to squeeze through. Then the inspector pulled out a little red book and marked down therein, "*Blaberus discoidalis* on orchids from South America." And that is all, except that *Blaberus* and others of his kind are doing very well now in New Jersey greenhouses. Of course, they are almost

omnivorous, are annoying, disgusting and troublesome, but still they don't bite the eyelashes off sleeping children here as they do in parts of Brazil, and that is something in their favour.

The Case of *Stephanitis pyrioides*.

It's a long distance from "cherry blossom" land to New Jersey, but the embryonic children of *Pyrioides* managed to make the trip in safety. *Stephanitis pyrioides* lived contentedly in Japan, on an azalea, sipping the sap now and then, watching over her brood, and taking pride in her beautiful, lace-like gauzy wings. Knowing upon the approach of cold weather, that she could not hope to live much longer, she carefully deposited in the leaves of the plant, close to the mid-ribs, tiny, oval eggs and then died contentedly. If this plant had only remained in Japan, all would have been well. But, there arose in New Jersey, a demand for Japanese azaleas, a demand which had to be supplied and so over the Pacific ocean, over the continent of North America, came the azaleas and the unborn children of *Stephanitis*. The inspector was on the watch for these plants and looked carefully over each one, but how was he to know of the tiny eggs hidden in the leaf tissue so effectually and not discoverable without a high-power microscope. He carried only a pocket lens, moreover he couldn't begin to pick off every leaf and tear it apart to see if anything was inside. The plants looked all right and so they were admitted.

And so the babies of *Stephanitis*'s grew up in New Jersey instead of Japan. Needless to say, they increased numerically to such an extent and made such a pest of themselves by sucking the sap out of nice, green, azalea leaves, that many owners of Japanese azaleas are forced every year to go through their gardens and squirt stuff on them with a little brass gun.

The Case of *Cholus forbesii*.

(Pl. XIV, fig. 3).

There lived in the tropical forests of Colombia, an attractive black and white-marked creature, which prowled around, sinking its beak into the leaves and bulbs of wild orchids growing on the trunks of trees, living a care-free life, unknown and unhonoured.

Some of the plants upon which it had bestowed its attention were later ripped from the trees by natives with long, sharp knives, and in the course of time finally came to grace the conservatory of a person whose aesthetic taste demanded orchids. It was only a question of time before *Cholus* made her appearance and started to feed on the scenery in that conservatory. It appears that she had smuggled either herself or her young along with the plants, undoubtedly in the tissue, which the inspector could not examine without destroying the plant, and in that way arrived safely at her destination.

Of course, the tropical atmosphere of a greenhouse does not approach that of her natural home but it is a fair substitute, and she can be contented provided the owner does not devote his attention to her extermination.

The foregoing cases, and it would be possible to cite numerous other ones, show how the insect fauna of New Jersey and other States is constantly being added to by undesirables from other countries. This immigration is taking place in spite of well-developed and well-enforced systems of inspection. The establishment of foreign pests in the United States is not always due to a laxity in the inspection service of any state. In most cases, the pests have entered undetected by the inspector, sometimes through his ignorance of foreign pests, sometimes on account of individual carelessness, but mostly on account of the impossibility of examining every leaf, twig, root and particle of soil around the roots of a plant and having anything left that will grow, especially when an inspector is called upon to examine hundreds of plants each day.

In other words, ordinary inspection will not keep out all foreign pests, and extraordinary inspection would not be tolerated by importing firms or paid for by state governments. The inspection does, however, prevent an overwhelming rush of such pests; it does hold and delay the spread of them at times until means of controlling them have been found or until they are no longer dangerous, and it has in the past served the country well; but it is useless to expect more from inspection however well carried out it may be.

The fact remains that by the importation of plants from foreign countries (64,652 cases were brought into the U. S. during the season of 1915-16, according to the report of the Fed. Hort. Bd. for year ending June 30, 1916) we are slowly but surely adding to the number of pests which we already have in this country, thereby increasing the burden which future generations will have to bear. And the remedy? A national quarantine of all foreign nursery stock.

EXPLANATION OF PLATE XIV.

Fig. 1, *Blaberus discoidalis*, a tropical roach (natural size).

Fig. 2, *Grylotalpa grylotalpa*, the European mole cricket (natural size.)

Fig. 3, *Cholus forbesii*, a tropical orchid weevil, (after H. S. Barber), (enlarged).

LECTOTYPES OF THE SPECIES OF HYMENOPTERA (EXCEPT APOIDEA) DESCRIBED BY ABBÉ PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

Introduction.

This paper, which is a contribution from the Branch of Cereal and Forage Insects and the Branch of Forest Insects, is largely based on an examination made in May and June, 1915, of the Provancher collections located in the Museum of Public Instruction at Quebec, and in the possession of Mr. W. Hague Harrington and the Department of Agriculture at Ottawa, Canada.

This study was undertaken in order to determine in so far as possible the correct position of the Provancher species in the modern classification and obtain notes which would supplement the original descriptions, and thus facilitate recognition of the species, many of which could not be certainly identified by the original description. Notes of greater or less extent were obtained on all but a few of the species of Hymenoptera, excluding the Apoidea, especial stress being laid, however, upon the sawflies and the parasitic forms belonging to the Ichneumonoidea. In some groups our notes consisted principally of a record of the

condition of the type. The limited time at our disposal made it impossible to attempt to secure full notes on any but the groups in which we were especially interested.

This paper is only a list of the species described by Provancher with the location, condition and designation of the type specimens, and is submitted at this time in order to establish definite premises on which to work and thus make it possible to publish in the future, systematic notes on the species with assurance that other workers will be able to use our remarks and find the same specimens we examined.

The only previous comprehensive study of the Provancher collections was made by Mr. G. C. Davis, who has published the results of his study in two reports[†]. Davis, however, confined himself entirely to the Ichneumonidae. The conclusions reached by him regarding the species, in the main, agree with our own, but in a number of instances do not coincide with ours. Davis made no attempt to establish lectotypes for the species, and, therefore, it was often impossible for us to determine on what specimens he based his conclusion.

Provancher's Life and Work.

Practically the first Canadian and in fact one of the first Americans to make a serious and comprehensive study of the Hymenoptera of Canada was Abbé Léon Provancher. Abbé Provancher was a French Canadian who was born, brought up and spent most of his life in the Province of Quebec. He died in 1892, and brief accounts of his life and work were afterward published in a number of journals.* Some years later Abbé Huard began a more extended biography which appeared in various issues of *Le Naturaliste Canadien*,** a magazine founded and edited, until shortly before his death, by Provancher. Since Provancher

[†]Some notes from a Study of the Provancher Collection of Ichneumonidae, 1894, Proc. Acad. Nat. Sc. Phil., pp. 184-190.

Review of a few more Provancher types of Ichneumonidae, 1895, Can. Ent., pp. 287-290.

*See especially Can. Ent., Vol. 24, 1892, pp. 130-131, and Entom. News, Vol. 6, 1895, p. 209, pl. IX.

**This interesting account has never been completed, but Abbé Huard told us it was his intention to complete it and we certainly hope he finds an opportunity to do so. For the parts published, see Nat. Can., 1894, 1895, 1896, 1897, 1898.

began his work in Quebec and spent most of his life there, it is not surprising to know that a large part of his collection came from that region. But later in his life he received much material from other people so that his completed collection included species from many parts of Canada, the United States, Europe and some of the West Indian Islands.

Provancher described about 923 species and a few genera of Hymenoptera and most of this great number are valid. His largest and most comprehensive work on Hymenoptera is *Petite Faune Entomologique du Canada* and its Additions, but besides this he published several shorter papers on Hymenoptera in which new species are described. Considering the time, lack of facilities and literature, and his comparative isolation, Provancher had a very good idea of the limits of a species. The weakest-point of his hymenopterological work was his conception of genera and generic limits. Even when we consider the genera he recognized, we often find that he placed the same or closely allied species in widely different genera. Hence, we find, especially in the parasites, that Provancher was often wrong in his generic placement of the species. His descriptions are accurate, and if we remember that the diagnostic characters of that period were limited mostly to colour, they are as satisfactory as these of his contemporaries.

Location of Collections.

Most of Provancher's types are in the Public Museum of Quebec, some are in the collection of Mr. W. Hague Harrington at Ottawa, a few are in the collection of the Canadian Department of Agriculture at Ottawa, while a few others were returned to Ashmead and Coquillett and are now in the United States National Museum. Some few types we were unable to locate. These may have been returned to the collectors.

In 1889 the College de Levis, Levis, Quebec, received a collection of insects from Provancher, and for some time it was thought to contain some of his types. Further investigation tends to prove that this collection was composed entirely of duplicates, and in certain cases these were not correctly determined.

A—Collection in the Public Museum at Quebec.

The collection in the Museum of Natural History, under the

Department of Public Instruction is now housed in the Parliamentary Building in Quebec, and is cared for by Abbé V. A. Huard and his assistant. In this Museum there are really two Provancher collections. The first was purchased in 1877 by the Museum and is known as the 1877 collection (in this paper referred to as the first collection). The other came to the Museum (through purchase) after Provancher's death, and is known as the Dernière Provancher collection, (in this paper referred to as the second collection). Both of these collections are in the cabinets obtained from Provancher, and most fortunately are still left as arranged by him. Each collection contains species not represented in the other, but in cases where the species was found represented in both collections and there was nothing in the description or manuscript notes to prevent, we have chosen as lectotype a specimen from the second collection, because this was the collection retained and used by Provancher until his death, and we are inclined to believe, even though he was not a "type-worshipper," that he would retain the actual type for future reference. Specimens in both collections bear small, yellow labels on which a number is printed. These numbers are species numbers and refer to a catalogue prepared by Provancher. Each insect order in both collections begins with the number one. In the Hymenoptera, therefore, considering both collections as a unit, we often have two, usually widely different species under the same number. There appears to be no instance in which the same species occurs under the same number in both collections. The two collections differ in the style of name label. The name label for the 1877 collection is on blue paper, while that for the second collection is on white paper which has a double red line (the outer being the heavier) around the margin.

The catalogues prepared by Provancher are in the Public Museum, and although they are little more than lists of numbers followed by names, with an occasional mention of locality, they are of some assistance in proving the way in which Provancher treated species reduced by him to synonymy.

A hasty examination of all the insects in both collections showed that they were in remarkably fine condition, considering that they are kept in wooden drawers unprotected by any repellent,

and which are closed by glass tops which set down inside, without any overlapping flange. A careful examination of the Hymenoptera proved that they were free from pests and in good condition. At the time of our visit the Hymenoptera of the 1877 collection were in museum case 35, and those of the second collection in the left hand column of case 46 and two drawers in the left hand column of case 49.

That Provancher had no concrete idea of the value of types is shown by the fact that in no case (with possibly a few exceptions in later years) were his types labeled as such. Furthermore, it is apparent that when he discovered one of his species to be a synonym he often removed the name label from the type and pinned the specimen among others of the species to which he thought it belonged. In other instances, upon deciding that one of his species was synonymous with another not already represented in his collection he removed the original name label and replaced it with what he considered to be the correct one. For example, there is no specimen in his collections labeled *Selandria flavicornis*. After describing this species Provancher concluded that it was the same as *Selandria halcyon*, and an examination of the catalogue shows under 60 the name *Selandria flavicornis* with the word "*flavicornis*" crossed out and above it written the word "*halcyon*." It, therefore, appears certain that the type of *Selandria flavicornis* stands in the collection under the name *Selandria halcyon*. In this case this is also proven by the fact that Provancher instead of supplying a new label just reversed the old label and wrote the name *Selandria halcyon* so that we find on the underside of the label for *S. halcyon* the original label for *Selandria flavicornis*. This one case is sufficient to show how Provancher worked. Many other similar cases could be mentioned. There are many cases, however, where there is no proof, either in the catalogue or in the labeling, that the types of some of Provancher's species which were later suppressed by him stand under the name of the species with which he considered them to be synonymous. In such cases we can only assume, from our knowledge of Provancher's methods, that this is what has taken place.

At no time while studying the collection did we remove any labels, and we were always very careful to put the specimens

back where they came from so that the collection still stands as it was arranged by Provancher. We did not even feel justified in labeling the specimens which we believed to be the type as lectotypes, and will rely in this paper entirely on the name label and the number label for means of correctly identifying the specimens which we believe should stand as type.

B—Harrington Collection.

The types in the Harrington collection are in good condition, and although they usually do not bear the name label in Provancher's writing we were assured by our friend Mr. W. H. Harrington that they were the identical specimens examined by Provancher as could easily be proven by a comparison of the number (they bear in addition to other labels a small, white square on which is written by Harrington a number) with the list as returned by Provancher.

C—Types in Collection of Canadian Department of Agriculture.

The types in the Department of Agriculture are in good condition, and have all been properly labeled as types.

D—Types in U. S. National Museum.

The types in the United States National Museum have all been accessioned and labeled with Museum type numbers.

Plan of Paper.

In submitting this list of the species described by Provancher and presenting notes on the location and condition of the types we have considered that it was much better to arrange them alphabetically as they appear in the final index published by Provancher as a conclusion to his two more important papers on Hymenoptera. We have chosen this method largely because there will be many more changes in generic position than those already published, and also because we do not know when we shall have an opportunity to completely review our notes and definitely assign the species of the genera as at present understood. Practically throughout this paper the word "type" is used in the sense of "lectotype." There are, however, certain cases when there was only one specimen, and there is no doubt that it is the specimen examined by Provancher and is, therefore, certainly the type.

At the time of our visit the type specimens of the species placed by Provancher in the Braconid subfamilies Aphidiinae and Opiinae were not available and the data on these were not secured. We hope, however, to secure and present it later.

Unless otherwise stated, it is to be understood that the specimens are in good condition. The letter (s) stands for the word "script." The numbers on the yellow labels are printed. Whenever possible, we chose as type the specimen which bore the name label written in Provancher's hand.

An Alphabetical List of Species With Designation of Lectotypes.

- Acerota opaca.** Type.—Yellow label 1381. 2nd Coll. Pub. Mus., Quebec. Two other specimens. Fair.
- Acoenites canadensis.** Type.—Male, yellow label 375. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ, right fore wing, hind tarsi, abdomen glued on.
- Acoenites flavipes.** Type.—Female, yellow label 1249. 2nd Coll. Pub. Mus., Quebec.
- Acordulocera saginata.** Type.—Yellow label 390. 2nd Coll. Pub. Mus., Quebec. Right fore wing gone.
- Acothyreus mellipes.** Type.—Yellow label 1320. 2nd Coll. Pub. Mus., Quebec. Fair.
- Ægilips aciculatus.** Type.—Not seen.
- Agathis femorator.** Type.—Female, yellow label 578. 2nd Coll. Pub. Mus., Quebec. Antennæ wanting.
- Agathis nigriceps.** Type.—Female, yellow label 1680. 2nd Coll. Pub. Mus., Quebec.
- Agathis perforator.** Type.—Female, yellow label 577. 2nd Coll. Pub. Mus., Quebec.
- Agathis quæsitator.** Type.—Female, yellow label 576. 2nd Coll. Pub. Mus., Quebec. Lacks head.
- Agathis scrutator.** Type.—Female, yellow label 1269. 2nd Coll. Pub. Mus., Quebec. Male allotype. Both glued on slips.
- Agathis tibiator.** Type.—Female, yellow label 579. 2nd Coll. Pub. Mus., Quebec.

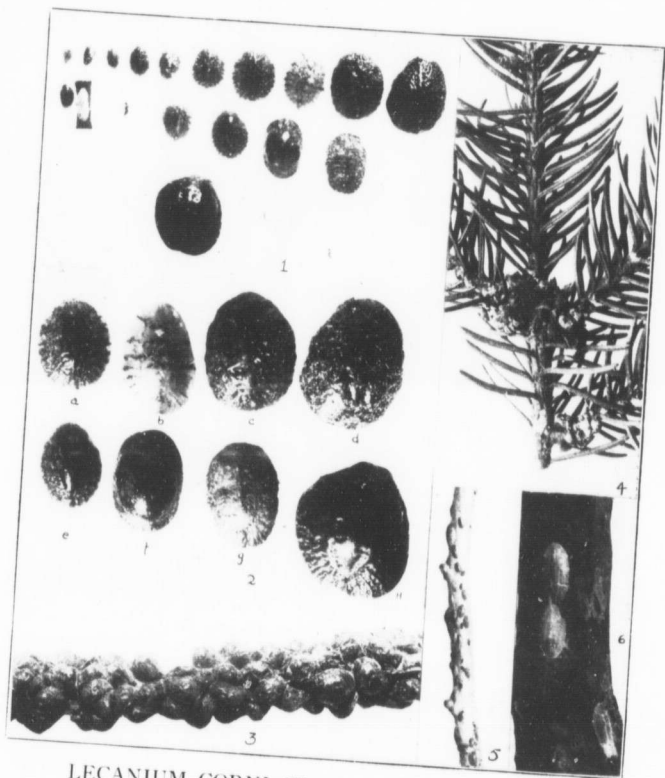
- Agenia atrata.** Allotype.—Male, blue label 125(s). Yellow label 1417. 2nd Coll. Pub. Mus., Quebec.
- Agenia perfecta.** Type.—Male, yellow label 783. 2nd Coll. Pub. Mus., Quebec. Antennæ wanting beyond 3rd joint. Four hind tibiae gone.
- Agenia rufigastra.** Type.—Female, blue label 122(s), yellow label 1419. 2nd Coll. Pub. Mus., Quebec.
- Allantus cogitans.** Type.—Female, yellow label 44. 2nd Coll. Pub. Mus., Quebec. Lacks right antenna. Two female paratypes. 1st Coll.
- Allantus robustus.** Type.—Female, Harrington Coll.
- Allantus rubricus.** Type.—Female, Harrington Coll. Lacks right antenna beyond 3rd joint.
- Alomya pulchra.** Type.—Not in Pub. Mus., Quebec, unless under name *Phygadeuon pubescens* Prov.
- Alysia astigma.** Type.—Female, yellow label 1051. 2nd Coll. Pub. Mus., Quebec. Left flagellum gone and only base of right remaining.
Same specimen used as type of *Aspilata astigma*.
- Alysia completa.** Type.—Female, yellow label 1166. 2nd Coll. Pub. Mus., Quebec.
- Alysia fossulata.** Type.—Cat. No. 1970, U. S. N. M.
- Alysia lucens.**—Type.—Female, yellow label 909. 2nd Coll. Pub. Mus., Quebec.
- Alysia nigriceps.** Type.—Female, yellow label 539. 2nd Coll. Pub. Mus., Quebec. Right flagellum and extreme apex of left gone.
- Alysia rubriceps.** Type.—Male, yellow label 1052. 2nd Coll. Pub. Mus., Quebec. Same specimen used as type of *Phæno-
carpa rubriceps* Prov.
- Alyson conicus.** Type.—Male, blue label 622(s), yellow label 1449. 2nd Coll. Pub. Mus., Quebec. Lacks most of left flagellum.
- Alyson guignardi.** Type.—Female, yellow label 1433. 2nd Coll. Pub. Mus., Quebec.
- Alyson triangulifer.** Type.—Male, yellow label 1450. 2nd Coll. Pub. Mus., Quebec. Lacks apices of antennæ.

- Amblyopone binodosa.** Type.—Yellow label 948. 2nd Coll. Pub. Mus., Quebec. Fair. (*Arotropus binodosa*).
- Amblyteles bifasciatus.** Type.—Yellow label 227. 1st Coll. Pub. Mus., Quebec.
- Amblyteles borealis.** Type.—Female, yellow label 1002. 2nd Coll. Pub. Mus., Quebec.
- Amblyteles indistinctus.** Type.—Female, yellow label 185. 2nd Coll. Pub. Mus., Quebec.
- Amblyteles macrocephalus.** Type.—Male, yellow label 1063. 2nd Coll. Pub. Mus., Quebec. Both antennæ broken, one at 1st flagellar joint, other at middle, 1 anterior, 1 median and 1 hind leg missing.
- Amblyteles marginatus.** Type.—Female, yellow label 700. 2nd Coll. Pub. Mus., Quebec.
- Amblyteles perluctuosus.** Type.—Female, yellow label 172. 2nd Coll. Pub. Mus., Quebec.
- Amblyteles quebecensis.** Type.—Yellow label 181. 2nd Coll. Pub. Mus., Quebec.
- Amblyteles stadaconensis.** Type.—Male, yellow label 175. 2nd Coll. Pub. Mus., Quebec.
- Amblyteles superbus.** Type.—Female, Harrington Coll.
- Amblyteles tetricus.** Type.—Female, yellow label 171. 2nd Coll. Pub. Mus., Quebec.
- Anacharis marginata.** Type.—Yellow label 1318. 2nd Coll. Pub. Mus., Quebec. Abdomen off but on triangle below.
- Anacharis pediculata.** Type.—Blue label 762(s), yellow label 1317. 2nd Coll. Pub. Mus., Quebec.
- Anacharis subcompressa.** Type.—White label "Quebec"; yellow label 616. 2nd Coll. Pub. Mus., Quebec. Abdomen gone.
- Anacrabro constrictus.** Type.—Male, tag-mounted, yellow label 1690. 2nd Coll. Pub. Mus., Quebec.
- Anacrabro lævis.** Type.—Female, yellow label 1691. 2nd Coll. Pub. Mus., Quebec.
- Andricus gibbosus.** Type.—Yellow label 609. 2nd Coll. Pub. Mus., Quebec. Head and abdomen gone. *Cynips (Andricus) gibbosa*—under *Cynips* in list.

- Aneurychus foveatus.** Type.—Blue label 83; yellow label 1330. 2nd Coll. Pub. Mus., Quebec. Fair.
- Aneurychus mellipes.** Type.—Yellow label 1331. 2nd Coll. Pub. Mus., Quebec.
- Anomalon chlamidatum.** Type.—Female, yellow label 1217. 2nd Coll. Pub. Mus., Quebec. Left antenna missing beyond fourth joint and right hind leg at coxa.
- Anomalon exile.** Type.—Female, yellow label 329. 1st Coll. Pub. Mus., Quebec. Left antenna at 15th joint, left median and both hind legs at coxæ gone; left fore wing gone and right broken at middle.
- Anomalon filiforme.** Type.—Female, yellow label 1218. 2nd Coll. Pub. Mus., Quebec.
- Anomalon nigripennis.** Type.—Probably pinned under *Exochilum mundum* Say. 1st Coll. Pub. Mus., Quebec.
- Anomalon rufulum.** Type and Allotype.—Harrington Coll. Both antennæ, tarsi, except one anterior, broken and lost. Female paratype yellow label 1213, blue label 481. 2nd Coll. Pub. Mus., Quebec.
- Anomalon unicolor.** Type.—Female, yellow label 1216. 2nd Coll. Pub. Mus., Quebec.
- Apanteles acaudus.** Type.—Female, yellow label 1285. 2nd Coll. Pub. Mus., Quebec.
- Apanteles carpatus.** Type.—Apparently destroyed. Pin bearing yellow label 592 in 2nd Coll. Pub. Mus., Quebec.
- Apanteles clavatus.** Type.—Female, yellow label 642. 2nd Coll. Pub. Mus., Quebec. Badly broken and plastered up with glue. Antennæ, one median and both hind legs gone. Specimen in U. S. N. M. labeled type not type.
- Apanteles cinctus.** Type.—Female, yellow label 716. 2nd Coll. Pub. Mus., Quebec. Antennæ broken near middle. Faun. 529. Add. S. 388.
- Apanteles crassicornis.** Type.—Female, yellow label 1269. 2nd Coll. Pub. Mus., Quebec. Antennæ and hind tarsi broken.
- Apanteles femur-nigrum.** Type.—Male, yellow label 1578. 2nd Coll. Pub. Mus., Quebec. One antenna broken, one front and one hind leg missing.

- Apanteles longicornis.** Type.—Female, yellow label 1258. 2nd Coll. Pub. Mus., Quebec.
- Aphæreta auripes.** Type.—Specimen in Public Mus., Quebec, bearing name label in Provancher's hand. Other data not taken. Specimen in U. S. N. M. labeled type, not type.
- Aphidaria basilaris.** Type.—See Introduction.
- Aphidius canadensis.** Type.—See Introduction.
- Aphidius nigrovarius.** Type.—See Introduction.
- Aphidius obscurus.** Type.—See Introduction.
- Aplomerus tibialis.** Type.—Female, Ent. Branch, Dept. Agr., Ottawa. Left antenna wanting beyond 5th joint.
- Arenetra quebecensis.** Type.—Not in Pub. Mus., Quebec, unless under *Lampronota regularis*.
- Arotes superbus.** Type.—Not in Pub. Mus., Quebec, unless under name *A. vicinus* Cress.
- Arotropus binodosus.**—See *Amblyopone*.
- Ascogaster rufipes.** Type.—Female, yellow label 1254. 2nd Coll. Pub. Mus., Quebec. Rather dirty. (This number in Prov. catalogue refers to *Chelonus rugulosus* Prov. There is no such species.)
- Aspilota astigma.**—See *Alysia astigma*.
- Atractodes autumnalis.** Type.—Female, yellow label 706. 2nd Coll. Pub. Mus., Quebec.
- Atractodes nigricoxus.** Type.—Male, yellow label 984. 2nd Coll. Pub. Mus., Quebec. Left hind tarsus broken at 2nd joint.
- Atractodes nitens.** Type.—Male, yellow label 695. 2nd Coll. Pub. Mus., Quebec. Female not located in either collection.
- Atractodes scapiphorus.** Type.—Yellow label 307. 2nd Coll. Pub. Mus., Quebec. Badly broken; only thorax, coxæ in part and wings, except right fore wing, remaining.
- Aulacus bilobatus.** Type.—Male, yellow label 82. 2nd Coll. Pub. Mus., Quebec. Left antenna gone.

(To be continued.)



LECANIUM CORNI (Fig. 1, 2, 3, 5 and 6) AND
PHYSOKERMES PICEÆ (Fig. 4).

OBSERVATIONS ON *LECANIUM CORNI* BOUCHE, and
PHYSOKERMES PICEÆ Schr.*

BY F. A. FENTON, COLUMBUS, O.

The following studies on the life history and habits of two of our common soft scale insects were made at Madison, Wisconsin, under the direction of Prof. J. G. Sanders. The writer is greatly indebted to Professor Sanders for invaluable assistance and to Mr. A. A. Girault for the determination of parasites.

THE EUROPEAN FRUIT *LECANIUM* (*Lecanium corni* Bouche).

Lecanium corni, probably native of Europe and one of our commonest and most widely distributed soft scales, has been the subject of much discussion in various scientific and popular journals. Sanders¹ has demonstrated that it is capable of much variation in form, size, and coloration even on the same host, and since it develops on numerous plants it is especially subject to a variety of normal environmental conditions. For instance, on hickory the ovipositing females are almost invariably white with black markings (Plate XV, fig. 2b), instead of the normal brown coloured forms (Plate XV, fig. 2a). Parasitism and disease produce abnormally developed forms, and these as well as immature individuals have been described as separate and distinct species.

History.—This insect was first reported in this country in 1851 when Fitch described it as *Lecanium tilia*². In 1859 it was found in Canada and in the United States as far west as Minnesota³, and in 1891 Crawford found it in large numbers in California⁴. Until 1908 there was much confusion regarding the identity of this species as its numerous synonyms indicate. It was found, however, that while external appearances might be extremely variable, certain microscopical characters remained constant, and Marchal⁵ and Sanders⁶ reduced to synonymy some forty so-called species, the form described by Bouche in 1844 as *Lecanium corni* having priority.

*Contributions from Entomological Department, University of Wisconsin.

1. Sanders, Jour. Ec. Ent., Vol. II, No. 6, pp. 443-445, 1909.

2. Fitch, 4th. Rep. Reg. Univ., N.Y., p. 69, 1859.

3. Fitch, 3rd Rep. Ins., N.Y., p. 50, 1859.

4. Crawford, Rep. Calif. Bd. Hort, p. 12, 1891.

5. Marchal, Ann. Soc. Ent. Fr., LXVII, p. 264, 1908.

6. Sanders, *loc. cit.*

September, 1917

Distribution and Economic Importance.—*Lecanium corni* is found throughout most of the United States and is known to occur as far north as Nova Scotia and Ontario, and south into Mexico. In spite of the wide range of its host plants and its general distribution this insect seldom becomes of economic importance, although serious outbreaks of it have been recorded. In 1891 Crawford⁷ reported its occurrence in California where it had become and still remains a serious pest of apricot and prune trees, and in 1894 Slingerland⁸ found a similar and doubtless the same species occurring in destructive abundance in the larger plum growing districts of New York.

Food Plants.—The European fruit lecanium, as already indicated, has been found on a wide variety of deciduous shrubs and trees, and it has received various popular names in different localities, according to its favorite host plant, being known in New York as the "plum scale," and in California as the "apricot scale". The following list gives an idea of the extent of its food plants.

<i>Aceraceæ</i>	<i>Acer macrophyllum</i>	
	" <i>negundo</i>	Box elder.
	" <i>saccharinum</i>	Soft maple.
	" <i>saccharum</i>	Sugar maple.
<i>Betulaceæ</i>	<i>Betula alba</i>	White birch.
	<i>Ostrya virginiana</i>	Hop hornbeam.
	<i>Corylus americana</i>	Hazelnut.
	" <i>rostrata</i>	Beaked hazelnut.
<i>Caprifoliaceæ</i>	<i>Viburnum pubescens</i>	Pursh.
<i>Celastraceæ</i>	<i>Evonymus sanguinea</i>	Evonymus.
<i>Compositæ</i>	<i>Grindelia</i> spp.....	
<i>Cornaceæ</i>	<i>Cornus alternifolia</i>	
	" <i>sanguinea</i>	
<i>Ericaceæ</i>	<i>Vaccinium corymbosum</i>	High bush blueberry.
<i>Fagaceæ</i>	<i>Castanea dentata</i>	Chestnut.
	<i>Quercus palustris</i>	Pin oak.
	".....	Laurel oak.

7. Crawford, *loc. cit.*

8. Slingerland, Cornell Exp. Sta. Bull. 83, 1894.

Hamamelidaceæ.....	<i>Liquidambar styraciflua</i>	Sweet gum.
Juglandaceæ.....	<i>Hicoria alba</i>	Shag-bark hickory.
	<i>Juglans cinerea</i>	Butternut.
	" <i>nigra</i>	Black walnut.
Lauraceæ.....	<i>Sassafras sassafras</i>	Sassafras.
Leguminosæ.....	<i>Cercis canadensis</i>	Red bud.
	<i>Gymnocladus dioica</i>	Kentucky coffee tree.
	<i>Cleditsia triacanthos</i>	Honey locust.
	<i>Robinia pseudacacia</i>	False acacia.
Magnoliaceæ.....	<i>Magnolia</i> spp.....	Magnolia.
Oleaceæ.....	<i>Fraxinus americana</i>	White ash.
	<i>Amelanchier canadensis</i>	Shad bush.
Rosaceæ.....	<i>Prunus armeniaca</i>	Apricot.
	" <i>cerasus</i>	Cherry.
	" <i>domestica</i>	Plum.
	" <i>galatensis</i>	Prune.
	<i>Pyrus communis</i>	Pear.
	" <i>malus</i>	Apple.
	<i>Rosa</i> spp.....	Rose.
	<i>Rubus</i> spp.....	Cultivated blackberry.
	<i>Rubus</i> spp.....	" raspberry.
Salicaceæ.....	<i>Populus</i> spp.....	Poplar.
	<i>Salix</i> spp.....	Willow.
Saxifragaceæ.....	<i>Ribes</i> spp.....	Currant.
	".....	Gooseberry.
Solanaceæ.....	<i>Solanum dulcamara</i>	Climbing bittersweet.
Tiliaceæ.....	<i>Tilia americana</i>	Linden.
Urticaceæ.....	<i>Celtis occidentalis</i>	Hackberry.
	<i>Maclura pomifera</i>	Osage orange.
	<i>Morus rubra</i>	Red mulberry.
	<i>Ulmus americana</i>	American elm.
Vitaceæ.....	<i>Vitis</i> spp.....	Grape.

Life History.—*Lecanium corni* passes the winter in the second instar, the larvæ being found attached to the bark, generally preferring the underside of the branch and appearing as small, brown, flattened, oval bodies closely appressed to the surface. The appendages are withdrawn beneath the scale over which a thin, transparent, waxy covering is secreted.

Growth in spring is coincident with the beginning of sap flow, the insects seldom migrating, and within a week moulting for the second time. (Plate XV, fig. 5). Following this the male larva undergoes a series of transformations quite distinct from those of the female.

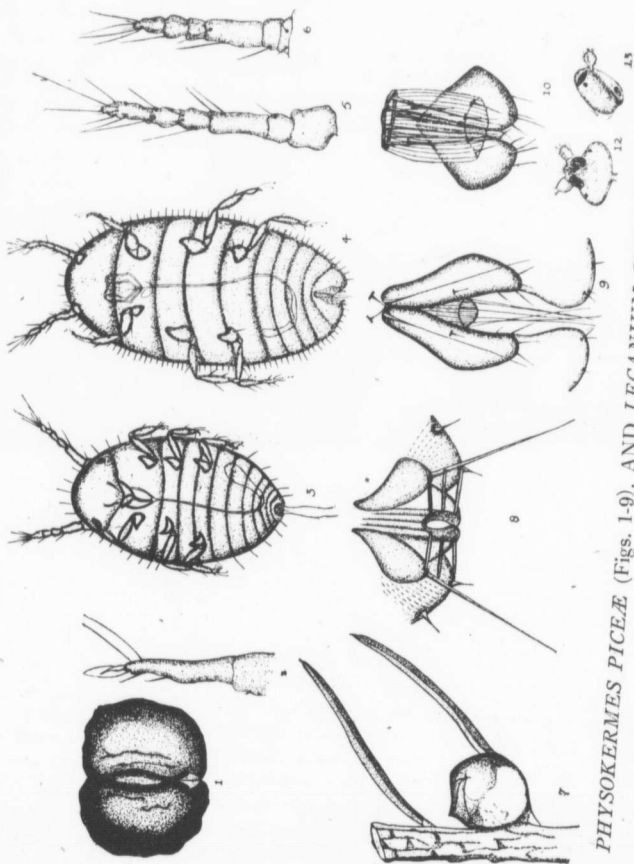
Male.—With the second moult the male enters a quiescent period known as the prepupal stage during which no food is taken, and which is characterized externally by the beginning of a wax secretion over the scale or puparium which becomes separate from the insect. All larval appendages are cast off and are replaced by the developing legs and wings of the adult. This period is transitional, seldom extending more than two days.

The true pupa, which is flesh-coloured, may be easily seen beneath the opaque puparium, being distinguished only by the further development of its appendages and by the distinct segmentation of the body. Externally the secretion of wax has continued and the male scales differ from those of the females in their smaller size, more elongate shape, and wire-glassy appearance.

In from three to seven days the final moult of the male takes place within the puparium and is indicated by the wings and developing caudal filaments which often protrude beyond the scale. (Plate XV, fig. 6.) In a few hours after the last transformation the mature insect backs out from the puparium and is ready for flight. It is very delicate and lives but a few hours.

The emergence of the male generally covers a period of four weeks, the date of earliest emergence depending largely on the host species. The first males were bred out from scales collected on linden. They issued from the middle of April till the middle of May. On hickory and bittersweet males did not begin to emerge until the first of May and continued to mature until the middle of June. On elm and white ash they did not begin to issue until late in May, and the last individuals appeared late in June.

Female.—Following the second moult the female increases rapidly in size. Owing to the continued growth the protective wax covering is split and appears as irregular plates on the dorsum. These finally disappear and when mature the female is smooth, broadly oval, and slightly convex, with darker markings plainly visible on the lighter specimens. The comparative size with that of the male is indicated on Plate XV, fig. 1. Several stiff iridescent strands of wax project from the margin of the scale which may function as a secondary sexual character. Shortly after impregnation a chestnut or brown colour prevails, the surface becomes



PHYSOKERMES PICEAE (Figs. 1-9), AND *LECANIUM CORNI* (Figs. 10-13).

pitted and as growth continues, the body is arched upwards becoming quite convex.

In the latitude of Southern Wisconsin development continues with great rapidity during May and early June, the ovisac becoming distended with eggs. Within three weeks the females stop feeding and a week later oviposition commences. Scattered individuals begin egg laying by May 25 but the majority not until June 11. The eggs are deposited beneath the scale in a cavity or brood chamber formed by the shrinking ovisac, and this process continues until the venter becomes fused with the dorsum. At the end of egg laying the parent insect remains as a mere shell, which acts as a barrier against various egg predators and parasites.

The number of eggs laid by a single female varies considerably and over two thousand have been counted⁹. Small individuals may contain only a few hundred, but the average number is considerably over a thousand.

The oviposition period terminates by the middle of June, and eggs under observation on different hosts began to hatch during the first days of July, although in one exceptional instance one female was found to contain hatching young June 12. July 5 *Lecanium corni* was found hatching on ash, linden and apple, and a few days later on bittersweet. Practically all the young had issued by July 1 in spite of the fact that the dates of oviposition extended nearly a month. The young remain under the old scale until it becomes loosened, which is usually about five days from the time the first eggs hatch. This short period of rest is not essential to the life of the insect, and when a scale is removed from hatching young they immediately migrate to the leaves. They generally settle on the underside and when numerous attach themselves along the principal veins, where they remain until autumn.

Just before the leaves fall the immature scales migrate back to the bark, having moulted once. The percentage of those successful in re-establishing themselves in this way is not known, and it is possible that many are distributed to different hosts* by the scattering of the leaves.

Description.—The eggs are oval, and protected by a powdery wax deposit, measuring .246 mm. by .112 mm. They are pure

⁹ Lowe, V. H., Rep. N. Y. State Exp. No. 14, 1895.

white when laid, but change to cream yellow previous to hatching.

The young larvæ measure .37 mm. in length and .135 mm. in width and are pale yellow, with eight distinct abdominal segments, but with no definite body divisions. The antennæ are short, six segmented, with numerous long setæ. Two anal plate spines are conspicuous, being about one-third the length of the body. After settling the insects assume a transparent green colour and are practically invisible on the surface of the leaf.

The second stage larva is distinguished microscopically from the first by the absence of the major apical setæ which disappear at the first moult. Upon migrating to the bark the green colour is replaced by brown. In this stage two sizes become differentiated, the larger measuring about one mm. in length, and the smaller .7 mm.

The puparium is a rather elongate oval structure 1.5 mm. in length and .75 mm. in width, the white, glassy colour sharply contrasting with the bark. It is slightly convex and is adorned by two longitudinal and two transverse white lines. (Plate, XV, fig. 6.) These scales are fragile and the empty ones are easily dislodged, seldom being found later in the season.

The adult male is a small, brown, two-winged insect $1\frac{1}{4}$ mm. in length, with a wing expanse of 4 mm. and having two long, white caudal filaments. The antennæ are relatively large, eight segmented, and densely clothed with hairs. The head is provided with six ocelli, one pair being located ventrally and two dorsally. (Plate XVI, figs. 12 and 13.) The wings are clouded with a tinge of brown and no halteres are present. There are six segments in the abdomen which terminates in a large style at either side of which are secreted the two long wax filaments.

At maturity the female is a smooth, brown hemisphere, and is incapable of locomotion, the appendages having been greatly outgrown by the swollen body which is fastened to the bark by a deposit of wax. (Plate XV, fig. 3.) Microscopically the anal plates (Plate XVI, fig. 10) are conspicuous and obtusely triangular, having eight anal ring setæ, four fringe, two sub-apical, and eight apical setæ. Fully mature females still possess the appendages though in an atrophied form, and may measure from 3 by 2 mm.

to 7 by 5 mm. During oviposition and accompanying the hardening of the derm, the latter becomes perforated with minute openings known as derm pores.

Experiments in host plant transfers.—A number of experiments were undertaken in view of definitely determining whether *Lecanium corni* could be transferred from one host plant to another, and the following table represents the results obtained.

TABLE I.—TRANSFER EXPERIMENTS WITH *LECANIUM CORNI*.

Original host	Number females used	Host transferred to	Date eggs hatched	Date larvæ attached	Number larvæ attached
White ash.....	3	pear	July 7	July 16	several
".....	1	apple	"	"	"
".....	1	elm	"	"	"
".....	1	plum	"	"	"
".....	2	sour cherry	"	"	"
Climbing bitter-sweet.....	several	apple	"	July 17	"
Elm.....	"	"	"	"	"
Linden.....	"	"	"	"	"
Kentucky coffee tree.....	"	"	"	"	"
Pear.....	"	"	"	"	"
Plum.....	"	"	"	"	"
Black locust.....	"	"	"	"	"
Plum.....	"	pear	"	"	"
Linden.....	"	"	"	"	"
Elm.....	"	"	"	"	"
Linden.....	"	currant	"	"	"
Ash.....	"	plum	unsuccessful		
Bittersweet.....	"	"	"		
Linden.....	"	ash	"		
Maple.....	"	shag bark hickory	"		

It will be observed that in several instances unsuccessful attempts were made to transfer *Lecanium corni*, but this was due to either parasitism or dislodgement of the females.

Parasites.—The following species of Chalcidoidea were bred from *corni*, which on some trees was badly parasitized and almost exterminated—*Coccophagus lecanii* Le Baron var., *C. cinguliventris* Gir., *C. perflavus* Gir. mss., *Blastothrix longipennis* How., and several male encyrtids. Besides these parasites, *Comys bicolor* How., *Coccophagus lecanii* Fitch, *Euderus lividus* Ashm., and *Aphicus albiceps* Ashm., have been bred from this scale in Michigan.¹⁰ By far the most numerous and effective one in this region proved to be *C. lecanii*, although in California *Comys fusca* How., a species not found at Madison, and probably not occurring in Wisconsin, seems to be the chief check.

Predators.—The maggots of a small fly, *Leucopsis nigricornis* Egger, were observed feeding on the eggs. Two common coccinellid beetles *Hyperaspis binotata* Say, and *Chilocorus bivulnerus* Mulsant, are important enemies, the larvæ feeding on the eggs and young.

Disease.—The adult females are susceptible to several fungous diseases, which with favourable conditions, spread rapidly and destroy many of the insects. *Cordyceps clavulatum* Ellis is the most important of these and was first mentioned as being parasitic on *Lecanium corni* by Pettit in 1895.¹¹

THE SPRUCE SCALE, (*Physokermes piceæ* Schr.).

Physokermes piceæ Schr. is found abundantly on the Norway spruce (*Picea abies*) about the University of Wisconsin campus, and has become a serious pest of this tree. It is especially numerous on the lower branches, many of which are being killed by it, and which are rendered unsightly by a black fungus thriving on the honey-dew secreted by these insects. The heavy honey-dew secretion is also very attractive to flies, and especially honey bees.

History and Distribution.—In 1903 *Physokermes piceæ* was believed to be confined to Europe,¹² and it was not reported in this country until 1906 when it was discovered near Hartford, Connecticut. Since then it has been found in various northern localities as far west as Wisconsin. The following list of American records of its distribution was kindly furnished by Mr. E. R. Sasser, of Washington, D.C., Massachusetts.

10. Lowe, V. H., *loc. cit.*, p. 589.

11. Pettit, R. H., Cornell Exp. Sta. Bull., 97, p. 341, 1895.

12. Fernald, M. E., Mass. Exp. Sta. Bull., No. 88, p. 209, 1903.

Massachusetts				
Amherst	<i>Picea abies</i>	June 9, 1908	B. N. Gates.	
"	" <i>menziesii</i>	" 8, 1910	" "	
Malden	" "	May 25, 1908	W. T. Harris.	
Hanover	<i>Pinus strobus</i>	Oct. 19, 1912	J. W. Hinckley.	
Connecticut				
Hartford	<i>Picea abies</i>	June 23, 1906	W. H. Patton.	
New Hampshire				
Pike	<i>Picea rubens</i>	" 3, 1909	E. J. Kraus.	
New York				
Yonkers	<i>Picea</i> spp.	" 15, 1912	W. L. Kingman.	
Pennsylvania				
West Chester	<i>Picea menziesii</i>	Nov. 28, 1914	F. Windle.	
Ontario				
Guelph	<i>Picea</i> spp.	July 14, 1910	T. D. Jarvis.	

It is thus an introduced species from Europe, and is dependent on spruce and pine as host plants. It in fact seems to prefer the Norway Spruce *Picea abies*, being found on no other tree in Madison, Wisconsin, although in some instances the infestation was surrounded by different species of spruce.

Life History.—In winter the second stage larvæ are found clustered thickly on the undersides of the spruce needles. They remain dormant until the latter part of March, when they become active and may be observed migrating from one branch to another. This period of spring activity is of short duration and by April the majority have settled on the leaves.

By the middle of April those larvæ which are to develop into females migrate to the twigs. The male larvæ remain attached to the undersides of the needles, where they moult twice during a period of development in which the insect passes successively from a propupal to a true pupal stage beneath the first exuvia which becomes coated with wax.¹³ The adult males issue within two weeks after the twigward migration of the females and fertilization takes place by the first of May, shortly following the second moult of the females.

Female.—The majority of the female larvæ settle in the woody bracts at the bases of the smaller twigs. In this stage growth is at first slow, and tendril-like wax filaments are secreted around the margin of the scale. In two weeks the insects moult for the second and last time, all appendages being lost, a mere globular sac resulting. This change takes place early in May,

13. Henschel, Die Schadl. Forst. and Obst. Ins., p. 511, 1895.

practically all larvæ being in the last instar by May 3. In this month growth is rapid, the females maturing by the first of June. Specimens dissected May 29 were found to contain fully developed eggs.

Oviposition began June 9 at which time large quantities of the honey-dew persisted. As the eggs are deposited the internal structures of the female shrink until the body organs become obliterated and persist as a thin septum dividing the egg chamber into halves. During the development of the insect, the anal cleft lengthens, due to the great enlargement of the body wall, until it comes to lie dorsally. Thus at the end of oviposition the female remains as a hollow sphere, divided internally into two cells closely packed with eggs, the number of which varies from only 12 in small individuals to as many as 227, the average being about 200.

The period of incubation extends for a month and larvæ were observed hatching July 27. At this time they are entirely surrounded by the body wall of the dead female, the anal cleft being entirely closed; but within a week, the mechanical drying and shrinking of the derm causes the cleft to split apart, producing an opening through which the young can pass. The larvæ immediately migrate to the spruce needles upon which they settle, growing slowly and moulting once before autumn.

Description.—The eggs are .4 mm. by .24 mm. and are smooth, ovate and pink in colour. The hatching young (Plate XVI, fig. 3.) are small, red, lice-like insects .5 mm. in length. Microscopically the antennæ are six-segmented, (Plate XVI, fig. 6), and the anal plate is well defined, having the usual major apical setæ, (Plate XVI, fig. 8). No spiracular spines are present in this species although found in others of this genus.

There is little difference between the two larval stages except that microscopically the anal plates are further developed, (Plate XVI, fig. 9). Just preceding the second moult the larva is about 1 mm. in length, (Plate XVI, fig. 4).

The adult female is a brown sphere, averaging from 1.5 mm. to 3 mm. in diameter, (Plate XVI, fig. 3). It presents a very curious appearance when alive, capped with a large transparent viscid globule of honey dew, and clothed basally with a thin sheath of white wax, (Plate XV, fig. 4). During life the body wall is plastic

and adapts itself to the irregularities in the bark, but upon maturing it becomes heavily chitinized and extremely rigid.

The old dead female shells are generally found at the juncture of the twigs in groups of from two to as many as eight. They are of a chestnut brown colour, closely resembling buds, and are dislodged with difficulty, often remaining attached to the bark for several years. Microscopically few structures are visible, the appendages and anal plate having been lost with the second moult.

Parasites.—A parasite seems to have been introduced with the species from Europe and is effective in checking the spread of the scale. This was determined to be a new species and was recently described by Girault as *Holcencyrtus physokermis*. *Cheiloneurus albicornis* How., and several encyrtids were bred from this insect.

A NEW CANADIAN NOCTUID.

BY WM. BARNES, M.D. AND J. MCDUNNOUGH, PH.D.
DECATUR, ILL.

Xylomoia chagnoni, sp. nov.

♂.—Antennæ finely ciliate; head and thorax light ruddy brown, the collar crossed by a black line; abdomen untufted, light ochreous; primaries rather pale ruddy-brown with the maculation not well defined, the most conspicuous feature being a black dash in the sub-median fold connecting the t. a. and t. p. lines; sub-basal line very obscure, angled below costa; t. a. line better defined, faintly geminate, the inner line more or less obsolete, the outer black, with a prominent outward angle below vein 1, preceded by a slight dark shade along inner margin; orbicular and reniform very faint, rather small, the former oblique, the latter defined on its inner edge by a black lunate mark; claviform scarcely visible resting on the black streak in the fold; t. p. line faint; strongly bent out around cell, then rigidly inwardly oblique to vein 1 where it bends outward slightly to inner margin, it is followed by a few dark points on the veins; s. t. line pale, obscure, irregular, defined outwardly by two darker terminal semi-triangular patches, the

September, 1917

one at inner angle, the other between veins 4-6; a rather heavy terminal broken black line; veins terminally slightly paler than ground colour; fringes smoky, cut by a median dark line and dotted with ochreous opposite veins. Secondaries pale shiny ochreous, shaded with smoky terminally, with large, dark discal dot and distinct wavy post-median line; a broken, dark, terminal line and a median line through pale fringes. Beneath smoky with slight ruddy tinge and paler secondaries; dark discal dots and terminal lines on both wings but post-median line of secondaries less distinct than on upper side. Expanse 30 mm.

Habitat.—Rouville Co., Que., (July 4); Mt. St. Hilaire, Que., (July 4, 6). 3 ♂'s. Type, Coll. Barnes. Paratype, Coll. Chagnon.

We have much pleasure in naming this species after Mr. G. Chagnon, of Montreal, from whom we received the type specimens. The species bears considerable superficial resemblance to *Xylomoia didonea* Sm. from Colorado, but lacks among other things the distinct white-marked t. p. line as well as showing a well-defined post-median line on secondaries; the front is rather improminent, being slightly less bulging than in *didonea* but the species resembles so markedly the figure of the generic type, *Xylomoia graminea* Staud., figured in Rom. Mem. VI, Pl. 12, fig. 8, that we incline to place it in this genus. We have single worn specimens of this new species from Cartwright, Man., and Durango, Colo., which would indicate an extended distribution.

AN ANNOTATED LIST OF THE SCOLYTID BEETLES OF OREGON.

BY W. J. CHAMBERLIN, OREGON EXPERIMENT STATION,
CORVALLIS, ORE.

Conophthorus ponderosæ Hopk.

There are a number of specimens in the College Collection taken at Corvallis, Oregon, Dec. 17, 1909.

Conophthorus, sp.

Three adults bred from cones of *Pinus contorta* collected at Corvallis, Oregon. Oct. 29, 1915.

Cryphalus amabilis, n. sp.

Length.—Female, 1.6 mm.; male 1.2 mm. Body oblong,
September, 1917

elliptical, dark brown, almost black; pronotum slightly broader than long, broadest just before the base, constricted sharply at base so as to be slightly narrower than the base of elytra; pronotum rounded, hood-shaped, anterior margin with two distinct teeth near the apex, an obscure tooth lateral to each; pronotum with prominent callosities arranged in six or seven, more or less concentric circles; spaces between callosities with minute elevations, elytra finely and densely punctured; striae plainly seen but appear as mere lines of enlarged punctures. Entire body covered with fine yellowish hair, short on elytra, longer and coarser on pronotum; ventral surface and legs clothed with medium long yellowish hairs.

Described from seven specimens, four males and three females taken at Elk Lake, Oregon, August, 1914, Host Amabilis Fir (*Abies amabilis*).

A small stand of Amabilis Fir (*Abies amabilis*) saplings was noted near Elk Lake at an elevation of 3,300 feet. The trees looked sickly and the foliage on many branches was turning red. Upon examination a tiny entrance hole was found just below many of the branches, and a small, oval chamber was eaten out. These chambers averaged from $\frac{1}{8}$ to $\frac{1}{4}$ inch across the longest diameter and from 20 to 35 eggs were deposited therein, mingled with fine bark borings. The eggs were slightly over $\frac{1}{2}$ mm. long and $\frac{1}{4}$ mm. wide, oval, transparent and white. The larvæ when first emerged are about the size of the egg and grow very slowly for some days. They develop to slightly over $2\frac{1}{4}$ mm. long, but never become very active. The pupæ are from $1\frac{3}{4}$ to 2 mm. in length and $\frac{1}{2}$ to $\frac{3}{4}$ mm. broad. The pupal cells are in the cambium.

Eggs are deposited the last week in August and hatch in 5 days; the slightly yellowish larvæ work out in all directions from the egg chamber, girdling the small limbs and covering a space of 5 or 6 square inches. Though not definitely established, it is very probable that each pair of beetles make more than one egg chamber. Both male and female work at excavating the egg chamber.

Cryphalus subconcentralis Hopk.

Astoria, Oregon. May 24, 1899. Hubbard & Schwarz.

Cryphalus grandis, n. sp.

Length 1.8 mm.; width 0.8 mm.

Body size and shape of *C. amabilis*; colour black. Pronotum with four teeth on the anterior margin, two central teeth large, rounded, lateral ones narrower, smaller. Dorsal surface rather densely clothed with pale hairs. First two lines of callosities on the pronotum regular, posterior portion more or less confused. The entire dorsal surface presents a granulate appearance, a condition not noted in any other species. Striae faintly evident, especially laterally; elytra sparsely clothed with long, bristle-like hairs. Faint transverse rugulae on the elytra. Elytra clothed with fine hairs (not scale-like) and finely obscurely punctate. Legs amber coloured, antennal club dark. Ventral surface clothed with recumbant, yellowish hairs. Lateral margin of the elytra shows a very broad emargination near the middle, and a distinct ridge extends from the humeri to the posterior lateral margin of the elytra. (Not constant.)

A large number of specimens from *Abies grandis* near Corvallis, Oregon, collected by the author. Hairs on pronotum dense, medium long, recumbent toward anterior margin; bristle-like hairs of dorsal surface very long.

Crypturgus, undes. sp.

A number of these minute insects were taken from a dead fir (*Abies lasiocarpa*) near Sumpter, Oregon, July 20, 1914. In company with other bark beetles, they were working in the dead bark near the top of the tree.

Dendroctonus valens Lec.

Rather common throughout the pine regions of the State. Especially abundant in *Pinus ponderosa* in Eastern and Central Oregon. Occasionally found at the base of the larger lodgepole pines (*P. contorta*). Noted at Corvallis, Hood River, Bend, Crescent, Sumpter, Sparta, Ashland and on the Klamath Indian Reservation. The habits of the *Dendroctonus* beetles are too well known to deserve comment here.

Dendroctonus monticolæ Hopk.

Found throughout the State in *Pinus ponderosa*, *contorta*, *monticola* and *lambertiana*, wherever these trees occur. It has caused heavy losses in Northeastern, Central and Southern Oregon.

Dendroctonus engelmanni Hopk.

This species has not heretofore been reported (in literature) from this State. The author collected two dead adults from their characteristic mines under the bark of *Picea engelmanni* near Sumpter, in the Blue Mountain Region of Northeastern Oregon.

Dendroctonus brevicomis Lec.

This is the most serious pest of pine in this State, and causes the death of a very large amount of the largest and finest yellow pine (*P. ponderosa*) timber of Eastern, Central and Southern Oregon. Thousands of dollars are being expended annually in combating the pest.

Dendroctonus pseudotsugæ Hopk.

Found in all parts of the State where Douglas fir grows. The beetles seem to prefer dying, injured or down timber, but will attack living, healthy trees as shown by a serious infestation in Southern Washington and near White Pine, Oregon, where several thousand trees were killed.

Dendroctonus obesus Mannh.

A rather rare beetle working in the cambium of Sitka spruce, *Picea sitchensis*, noted at Marshfield and Astoria.

Dendroctonus jeffreyi Hopk.

This species is reported by Dr. Hopkins as occurring in Southwestern Oregon. I have seen no specimens collected in this State.

Dolargus pumilus Mannh.

Oregon (Swaine 1908) in *Picea sitchensis*.

Dryocoetes autographus Ratz.

A number of specimens referred to this species were collected near Detroit, Oregon, from the bark of large Douglas fir windfalls.

Dryocoetes pseudotsugæ Swaine.

This species is not uncommon in the western part of the State. At Ranier the adults were found in January, crowded into hibernation galleries in the outer bark of Douglas fir. In December near Olney they were found under the bark of a Douglas fir stump, when the bark was removed, the larvæ were found to be actually floating in water. Specimens brought into the laboratory matured, thus showing that they have adapted themselves to the extremely wet winters of that section. Also noted at Corvallis and Detroit, Oregon.

Eccoptogaster unispinosus Lec.

A species widely distributed in the State, works in Larch (*Larix occidentalis*), Douglas fir (*Pseudotsugæ taxifolia*), and Engelmann Spruce (*Picea engelmanni*). It is not uncommon, in the thin bark of Douglas fir saplings, and limbs of older trees. It was recently bred from thick bark taken from near the base of a large tree, here the species evidently spent its full life cycle in the bark never reaching the cambium. It often causes the death of saplings and young poles.

Eccoptogaster, n. sp.

A species resembling *unispinosus* in size and form but differing in the spines was taken in numbers from the twigs of a dying Grand fir (*Abies grandis*) at Corvallis, in September, 1916.

Eccoptogaster subscaber Lec.

Found throughout the State working in *Abies*, especially *A. grandis*. The adult makes a short transverse gallery from 1 to 3 inches long, 30 to 50 eggs are deposited, and the larvæ work up and down the tree. (They are doing considerable damage at Klamath Lake in white firs). These larval mines are often a foot long; the pupal cells may be wholly in the bark, wholly in the wood, or partly in each. It is not unusual to find a tree so heavily attacked that it would be impossible to find a square inch free from mines. Larva, pupa and adults were taken at Ashland, Oregon, June 21, 1916.

Gnathotrichus sulcatus Lec.

Common in dying trees, especially in the western portions of the State. This ambrosia beetle has been taken from *Abies grandis*, *A. nobilis*, *Pseudotsuga taxifolia* and *Tsuga heterophylla*. Noted at Corvallis, Detroit, Astoria, and in the Blue Mountain Region.

Gnathotrichus retusus Lec.

A similar species found in *Tsuga heterophylla*, *Pinus contorta*, *P. ponderosa* and *Pseudotsuga taxifolia*. Most abundant in the Coast Range and Blue Mountains.

Gnathotrichus sp.

A species which I am unable to place among the described species was taken from Alder (*Alnus oregona*) at Florence, Oregon, in April, 1914.

Gnathotrichus sp.

A species similar to the last was taken from a healthy maple (*Acer macrophyllum*) at Corvallis, Oregon, in May, 1916.

Hylastinus obscurus Mannh.

The common clover root-borer is found in both Eastern and Western Oregon.

Hylesinus aculeatus Say.

Not abundant but is found attacking *Fraxinus oregona* in the western valleys. The work of this beetle often presents a masterpiece of wood engraving. The adult and larval mines are often as perfect and symmetrical as if done by the hand of an expert engraver.

Hylesinus aspericollis Lec.

A rather common species attacking living and dying alder (*Alnus oregona*). It usually selects young trees, but in the late summer of 1914 the author collected a number of adults from newly made burrows on large limbs of old trees near Breitenbush Hot Springs, Oregon. They worked in pairs, each helping in the excavation. In August many of the burrows were just being started. Noted at Florence and Corvallis, Oregon.

Hylesinus granulatus Lec.

Collected from *Abies grandis* in Blue Mountains of Oregon, in July, 1914.

Hylesinus dentatus Lec.

Rare, found in *Juniperus occidentalis*.

Hylesinus imperialis Lec.

Rare, Corvallis, May and September.

Hylurgops rugipennis Mannh.

Large numbers of these beetles were collected under the bark of a large, dead white pine (*Pinus monticola*) in the Santiam National Forest. August 21, 1914.

Hylurgops subcostulatus Mannh.

A decidedly secondary pest, entering dying or dead *Pinus ponderosa* after other Scolytids have started their work, occurring in large numbers at times. They were found especially numerous in the yellow pine of the Blue Mountain Region.

Hylurgops lecontei Swaine.

A species similar to *subcostulatus* occurring in yellow and lodge-

pole pine in the eastern portion of the State, and in the coast variety of *Pinus contorta* near the mouth of the Siuslaw River.
Hylurgops pinifex Fitch.

Reported from Oregon by Dr. Leconte.

Ips emarginatus Lec.

These large *Ipidae* attack the cambium of the lower and middle trunk of *Pinus ponderosa* and *P. contorta*. They excavate large mines, running parallel with the grain of the wood, often cutting through the mines of *D. valens*, *monticola*, and *brevicomis* with which they associate. As a rule the mines are nearly straight, but at times they wind around considerably without any particular pattern. Larva of all stages, together with adults were collected in the Blue Mountains during June and July. They attack living, dying and recently dead trees, both standing and fallen.

Ips, n. sp.

A species allied to Leconte's *balsameus* was collected from dead *Pinus ponderosa* at Hood River, in August, by Mr. LeRoy Childs. The tree had been dead at least two years. The *Ips* galleries were so cut by galleries of other beetles that it was almost impossible to get the design.

Ips latidens Lec.

Collected from *Pinus ponderosa* on Boundry Creek, Grant County, Oregon, June, 1914.

Ips radiata Hopk.

Not uncommon in *Pinus contorta* and *P. ponderosa* in the Blue Mountain Region of Eastern Oregon.

Ips rectus Lec.

I have not been able to identify this species in any of the material collected, but it is reported from Oregon by Dr. Leconte.
Ips wieslanderi Swaine.

Collected under the bark of drying lodgepole pine (*P. contorta*) in the Whitman National Forest in July, 1914.

Ips oregona Hopk.

Large numbers of these beetles were found at Bend and Ashland attacking living, dying and recently felled yellow pine, showing a decided preference for the latter. More than one pair of adults are often found in the same gallery. Adults and eggs

were common at Bend, May 19, while larvæ and pupæ were found at Ashland, June 20. Many were found dead, imbedded in pitch on the stumps. The egg galleries are usually 7 to 8 inches long, though it is not uncommon to find them 12 to 18 inches or even more in length. These galleries are usually fairly straight, running parallel with the grain of the wood. Occasionally they are irregular, crossing and recrossing other galleries, making a complex pattern. The typical work consists of an irregular round chamber, about half an inch in diameter from which the egg galleries run up or down the tree trunk. Each female has her own gallery in which 20 to 40 eggs are deposited along the sides and carefully covered with fine borings.

Ips pini Lec.

Reported from Oregon by Leconte in 1868.

Ips interruptus Mannh.

A single specimen taken from *Picea sitchensis* at Marshfield, Oregon.

Ips interpunctatus Eich.

Collected from *Pinus contorta* on the Whitman National Forest in July, 1914.

Ips concinnus Mannh.

This species ordinarily attacks *Pinus contorta* and *Picea sitchensis*, and it was very unusual to take several adults from a fire-injured Douglas fir sapling at Astoria in April, 1915. This is probably an accidental host, and it is interesting to note that the broods failed to develop.

Ips calatus var.

Collected from *Picea engelmanni*, Grant County, Oregon, June, 1914.

Ips confusus Lec.

Occurs in the extreme southern part of the State in pine.

Leperisinus aculeatus Lec.

A single specimen collected at Corvallis. Host not known. *Orthotomicus ornatus* Swaine.

A few specimens taken from *Pinus ponderosa* on the Whitman National Forest, July, 1914.

(To be continued.)

Mailed September 1st, 1917.