

(Then followed a general discussion regarding the woolly aphid.)

Question: Have you any remedy to keep strawberry-plants from being destroyed? Sometimes when the plant is in full bearing it dies down, and the heart of the plant turns quite black.

Mr. Treherne: In our experience with strawberry-plants we find three distinct causes. The first is caused by the dampness of the soil that produces a rot of the root; secondly, of the leaf; this is due to the dampness of the soil, as well as the lack of lime in the soil. The soil around here would stand 2 tons of lime to the acre without doing any damage to it. Then the second cause is overproduction. The spring opens up so moderately that, unless a spring frost comes, we often get an overproduction of fruit, resulting in some dried-up strawberries. If the spring frost comes along and nips off a quarter or half of the blossoms, then you will have a good crop. Thirdly, you will find a white grub in the roots. These are the various causes, and I do not know to which one you refer.

Mr. Day: I will now call on Mr. W. H. Lyne, Assistant Inspector of Fruit Pests, Vancouver, to read his paper on "Remarks on the Life-history of Codling-moth on the Pacific Coast of British Columbia."

COMMENTS ON SOME PECULIARITIES IN CONNECTION WITH THE LIFE-HISTORY OF THE CODLING-MOTH ON THE PACIFIC COAST.

BY W. H. LYNE, ASSISTANT INSPECTOR OF FRUIT PESTS.

The history of the codling-moth on the Pacific Coast appears to have been a repetition of misunderstandings as to the insect's ability to acclimatize itself to the peculiar atmospheric conditions near the sea-coast. Perhaps the first locality to experience its mistake was Santa Cruz County, California, where it was prophesied that on account of the salt air and damp, foggy weather that prevailed so much during certain seasons, the codling-moth would not thrive, and if it managed to exist at all would never be of any economic importance.

However, the facts are these: that within ten years from the time of inception this industrious insect had become the scourge of the apple-growers in that locality; and so it has repeated its history at one point after another in California, Oregon, and Washington, until about five years ago we suddenly awakened to the fact that, although a few stray specimens were known to have been in existence for a few years previous in the Victoria and Saanich District on Vancouver Island, the codling-moth had finally demonstrated its ability to become just as great a pest and nuisance to the apple and pear growers of Vancouver Island as in many other places. The situation as discovered demanded immediate action on the part of those who were responsible for keeping the pest out of the Province, and it was during the campaign of exterminating this invader that special attention was paid to many details peculiar to its habits and life-history in general.

Just about this time there was considerable discussion by experts and others in the Western States as to whether the moth could be controlled with one application of arsenate of lead at the time blossoms were falling, or what is often termed "calyx-spraying," the aim being to fill the calyx-cup of the fruit, just forming, before it closed, after which the inside cavity is fortified against the attack of the young larva attempting to enter. Those in favour of one spraying appear to have been under the impression that nearly all the larvæ of the first brood entered the fruit by way of the calyx or blossom end, and by so doing consumed the poison in the calyx-cup, thus ending their career.

During the process of searching every tree for wormy fruit, in order to ascertain the amount of infection and destroy all that could be found, a close check was kept

as to which part of the apple or pear the larva made its entry, resulting in the following record:—

Year, 1909, Victoria District, commencing July 5th.	Infected Apples and Pears.	Larvæ entered Fruit at Calyx.	Entered Fruit at Points other than Calyx.	Doubt- ful.	Larvæ found under Bands.	Larvæ found under Bark.
July	247	140	82	25
August	5,118	2,117	2,361	640	239	...
September	2,245	630	1,253	362	420	50
Totals	7,610	2,887	3,696	1,027	659	50

The table of infection proves that the greater number of moths hatched out between July 1st and August 15th, and during the whole season not more than 50 per cent. of the larvæ entered the fruit at the calyx, thus making it absolutely necessary to spray a second time at least, so that the enlarged surface of the fruit that had developed since the first spraying should be protected against the attack of the young larvæ that had hatched from the eggs deposited on the fruit by the moth, which did not commence to fly, or practically exist, until a month to six weeks after the first spraying. This, I think, proves clearly that the first spraying would only account for about 50 per cent. of the larvæ, which was all that made any attempt to enter at the point containing the poison,—viz., the calyx.

I think it well to say that I am fairly well acquainted with the literature published in the United States and Canada on the codling-moth, and have known that the majority of investigators have determined that about 75 per cent. enter at the calyx and 25 per cent. at other points. I am inclined to think that the records of Victoria, B.C., conditions, of 50 per cent. calyx-infection, are unique, so far as this point goes. I am satisfied to state that our records were made from a complete set of records, involving the entire area of infestation, where every apple was examined individually and carefully. When it can be shown that the entire outbreak involved the examination of 7,610 fruits, we were not able to go very far wrong.

This much may be said, however: that the calyx-infestation percentage was higher in the early summer, but it gradually decreased, with the result at the end of the period of hatching the points of entrance were equalled. This may be due to the gradual opening of the spring, accompanied by cool nights and a longer drawn-out emergence and hatching period of the moth.

Our records show that the first moths did not begin to hatch out from their winter cocoons until the middle of June, and very few were on the wing before July 1st; by the middle of September the pupating or hatching season was over, and the percentage of the second brood was so small as to be scarcely recognized.

Considerable difference of opinion exists as to the exact time for codling-moth spraying and the number of times to spray. Everything depends upon the peculiar characteristics and life-history of the moth in any or every district, as atmospheric conditions have everything to do with regard to the number of broods hatching out in the one season.

In order that the first or calyx spraying should be sufficient to control the infection, it would be necessary for all the first brood to enter at the calyx, but unfortunately, as has been shown, the larva chooses to use its own discretion as to just where and when it should enter the fruit. Some preferred to enter at the side, where two apples were touching, or in contact with a leaf or branch, while others entered at the stem end. No larva was discovered to have left the fruit until after the middle of August, proving that none of the worms infesting the fruit during that month were from a second brood. It required about thirty days for a larva to gain its full growth in the fruit. Those that pupated again during the same season were about twelve days from the date of leaving the fruit until hatching out to the new moth.

These details, on the whole, appear to tally pretty closely with the metamorphosis of the moth in other latitudes, with the exception that the number of broods per season are not so numerous this far north as they are to the south.

So far as our success of getting rid of the codling-moth on Vancouver Island is concerned, I felt quite safe the other day when I informed a gentleman that, if I gave him \$5 on condition that he find me a codling-moth larva, he would think he had more than earned the money.

(Then followed a general discussion regarding the codling-moth.)

Mr. Day: I will now call on Mr. R. C. Treherne, Field Officer, Dominion Division of Entomology, Agassiz, to give his lecture on "Insects affecting Shade-trees and Ornamentals around Vancouver."

SHADE-TREE AND ORNAMENTAL INSECTS OF BRITISH COLUMBIA.

BY R. C. TREHERNE, FIELD OFFICER, ENTOMOLOGICAL BRANCH, DOMINION DEPARTMENT OF AGRICULTURE, AGASSIZ, B.C.

The subject I propose to take up to-day is naturally one that appeals to garden-lovers and those especially interested in the beautification of boulevards and parks. I do not propose to make an exhaustive study of all the insects found on shade-trees and ornamentals, but merely to touch upon certain of the more important and most noticeable, which year in and year out attract attention by their presence.

HEMIPTERA (TRUE BUGS).

SCALE-INSECTS.

Scale-insects are those which cover themselves with a waxy shield or scale, under which they lie protected and hidden from view. It is only necessary to draw your attention to the very familiar oyster-shell scale (*Lepidosaphes ulmi*) to give you an excellent illustration of the type of insect referred to as a "scale-insect." This oyster-shell scale occurs on a great many different species of shrubs and trees in this part of the world (see Bull. 5), and being very plentiful and numerous may readily be taken and studied, in a general way, as a type. Its common name indicates its appearance, and there is no other insect so readily available that has such characteristic markings. Beneath these protecting scales the soft-bodied insects lie immovable, but are able to grow and reproduce. Each one is furnished with a minute "sucker," which is inserted into the plant-tissue, thereby obtaining nourishment for itself.

Other scale-insects of ornamentals may be observed in the vicinity (Vancouver, B.C.), notably the following:—

The rose-scale (*Aulacaspis rosæ*).

The cottony maple-scale (*Pulvinaria innumerabilis* Rathv.).

The European fruit-scale (*Aspidiotus ostryiformis*).

Lecanium spp. on maples, laurels, etc.

Chionaspis palm-scale (*Chrysomphalus dictyospermi*).

The cottony maple-scale, found on stems and twigs of maples and many rosaceous plants, presents a familiar appearance with its white cottony exudation beneath a brown shield or scale. The European fruit-scale, found on the mountain-ash, flowering crabs, etc., may be recognized as minute black specks with orange-coloured centres or "nipples." The Lecaniums, of which it is believed two species occur in Vancouver on maples, laurels, etc.—viz., *hemisphericum* and *hesperidum*—are known as somewhat large, spherical brown scales on the stems and leaves. All these scales may be controlled by the use of kerosene emulsion in the spring, or by caustic-soda applications during winter. The palm-scale is peculiar to plants and ferns in the greenhouse and conservatory, and the rose-scale has been taken in North Vancouver.

APHIDES.

These insects, commonly referred to as "green lice," form colonies on the leaves and twigs of plants they attack. The species frequently found on roses may be taken