

It has been frequently observed, in examining scales for the presence of this mite, that the only indication of its work will be a cluster of eggs lying just beneath the caudal margin of the scale, the parent that deposited them having evidently moved off to some other location. The number of eggs laid by a single female does not appear to be known, but, from information gleaned during the work with the mite at Vernon, it would appear that individual females deposited a few eggs beneath a number of scales, as the eggs when found varied in numbers from half a dozen to fifteen or twenty. Between May 7th and 18th, 119 scales were examined for the presence of the mite, these scales being taken from various localities in the mite-infested area; it was found that mites were present beneath 22 of them, six individuals being the greatest number seen beneath a single scale. The fact that this mite feeds upon the San Jose Scale has been well established. Mr. Dearness, in 1899, received samples of this scale from Kent County, Ontario, and found numbers of the mite feeding upon the mature female scale insects, as many as eighteen larval mites being observed beneath a single scale.

Various other species of mites will be encountered beneath the empty scales of the oyster shell scale; among these may be noted two species known to occur in British Columbia, **Tydeus gloveri**, a gregarious species, which may be found to the number of 15 or 20 beneath a single scale; this species is recognizable by the median line on the abdomen.

A species of **Gamasus** will also be found hibernating beneath the empty scales; this is a fairly large mite, possessing two conspicuous whitish markings extending almost the whole length of the body.

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### INSECTS OF ECONOMIC IMPORTANCE IN THE FRASER VALLEY IN 1921

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On several occasions in the past ten years, since the resuscitation of the Society, members have given papers dealing in a general way with insect conditions during that year in the various districts that they happened to be located in.

These may be found in the Proceedings under such titles as: "Report from Vancouver," "Report from Okanagan District," "Insects of the Lower Fraser Valley," etc., etc., and have been contributed by such respected members of our Society as the late Messrs. Thos. Cunningham and Tom Wilson, Messrs. Treherne, Ruhman, Venables, Brittain, and others. These papers, with the Reviews of Applied Entomology contributed from time to time by Mr. Treherne, while possibly of only passing interest at the time, will undoubtedly form a very valuable history of Economic Entomology in this Province, their value increasing with age.

The year 1921 was marked by no great insect outbreak on the Lower Mainland. Even the mosquito crop failed to materialize, and the chief trouble was from the insidious attentions of our usual pests. Looking back over our previous papers covering this district, I find about thirty-five chief pests mentioned, and while I will not touch at length on all of these, it will be interesting for future comparison to mention their scarcity or abundance.

#### VEGETABLE INSECTS

*The Imported Cabbage Worm* (***Pieris rapae* L.**).—This was plentiful this year and took its usual toll of cruciferous vegetables. It is surprising that an insect so easily controlled is allowed to do so much damage. A remedy that appeals to me always, from its simplicity, is the lime-arsenate dusting. Lime (twenty pounds), and lead arsenate powder (one pound), dusted on the leaves when wet with dew in the early morning.

*The Cabbage Root Maggot* (***Hylemyia brassicae* Bouche**).—This insect was also very abundant this year, and there is now no reason for growers to take a loss with the 100% immunity obtained by the mercury bi-chloride treatment—1 ounce to 10 gallons in three treatments.

*Cutworms*.—With the exception of the variegated cutworm (***Lycophotia margaritosa* Haw**), but little damage from these insects came to my notice. The above exception was, however, plentiful in August in various points in the Valley, and one record of damage was received from Golden, in the Columbia Valley. No parasites were recovered from material reared and collected at Agassiz; we therefore may possibly have an epidemic next year, as was the case in 1900 and 1905. Tomatoes were the chief crop affected, and the climbing habit of this species was demonstrated on this host, the fruits being eaten right to the top of the plant.

Some damage to mangolds and beets was reported from Lulu Island in June from cutworms, but the species was not ascertained.

*Slugs*.—Although not insects technically, entomologists are usually consulted regarding these troublesome mollusks, which this year were unusually abundant in the Fraser Valley. The usual remedies were apparently insufficient to check them, and much damage was done, especially to young corn, which in some instances had to be replanted.

Liming on **three** consecutive nights is, I am told, a certain remedy. Bordeaux mixture is also strongly recommended by workers in Oregon as being highly distasteful to slugs.

*Flea Beetles*.—Cabbage, turnips, hops and potatoes all suffered this year from these pests, which are not easy to control during the summer. The hop yards rely chiefly on clearing up the hibernating places as a control measure.

## SHADE TREE INSECTS

*Antique Tussock Moth* (**Notolophus badia**).—The moths were quite abundant in Vancouver this fall. No damage, however, was noticed this summer from the feeding larvae, although I frequently came across them on poplars when on Satin moth studies. Mr. Bush recorded an epidemic in 1911.

*Tent Caterpillars* (**Malacosoma disstria erosa** Hbn and **M. pluvialis Dyar**).—These two species reached their maximum last year, and this year a slight decline was noticed; parasites, both egg and larval, being frequently noted. Wilt diseases, however, so common in the two previous years, were not noted this summer. These insects are again appearing at points up the Fraser Valley, where for several years they have been absent.

*Fall Web-Worm* (**Hyphantria cunea** Dru).—Again abundant all over the Valley. Hymenopterous parasites were frequently noted in the webs.

*Satin Moth* (**Stilpnotia salicis** L).—This insect, first located in the Province at Westminster in July, 1920, by officers of the Dominion Entomological Branch, has to be included in our list of shade tree depredators. Of European origin, introduced probably at least five years ago, this prolific insect was very conspicuous this summer in Vancouver and Westminster, and made a sorry mess of the poplars in these two towns.

Although little was known regarding its economic importance in its native habitat, its close relationship to the Gipsy and Brown Tail moths, Liparids like itself, singled it out for immediate attention by the Entomological Branch, and last year hopes were entertained and endeavours made to stamp out the outbreak in Westminster. Its discovery, however, in an area of larger extent in Vancouver, and also at Cowichan Bay on Vancouver Island, and at Maillardville near Westminster, showed the futility of entertaining these hopes with the funds likely to be available. We will, therefore, most probably have a permanent addition to our lepidopterous fauna, whether of great importance or not it is not possible to say at the present time.

It has so far been found chiefly on the Lombardy, White, and Black poplars in British Columbia, all introduced species, though also found sparingly on the native cottonwood, **Populus trichocarpa**; should it eventually accept this tree as readily as the introduced kinds which are its food plants in Europe, it would become a serious pest. As it is, it has caused considerable damage and annoyance, and has now spread over the whole area of Greater Vancouver wherever poplars have been planted.

## FRUIT INSECTS

Previous reports recorded the following insects in varying degrees of destructiveness. These were noted as present this year, but in no cases were they serious:

- The bud moth (**Tmetocera ocellana**, D. & S.)  
 The cherry and pear slug (**Caliroa cerasi**, L.)  
 The cigar case bearer (**Coleophora fletcherella**, Fernald).  
 The lesser apple worm (**Enarmonia prunivora**, Walsh).  
 The apple leaf hopper (**Empoasca mali**, Le Baron).  
 The oyster shell scale (**Lepidosaphes ulmi**, L.)  
 The pear leaf blister mite (**Eriophyes pyri** Pgst).  
 The apple dock sawfly or dock false worm (**Ametastegia glabrata** Fallen), mentioned as possibly present in the Valley in 1914 by Mr. Treherne, has now been found at Agassiz.

#### SMALL FRUIT INSECTS

*Strawberry Root Weevils* (**Brachyrhinus ovatus and sulcatus**).—These caused much damage all over the small fruit areas. Several cases were reported of the second annual crop being a failure and the plantations being plowed up. A new species for British Columbia, **B. rugifrons**, was reared at Agassiz from larval material collected at Mission. From its apparent abundance, this pest, recognized in Washington and Oregon as of greater importance than **ovatus** or **sulcatus**, is possibly supplanting these species in the Lower Fraser Valley plantations. It was entirely absent in 1913, we may presume, as it is not reported by Mr. Treherne, who made exhaustive experiments on strawberry root weevils in the Mission district in 1912 and 1913.

*The Currant Fruit Fly* (**Epochra canadensis** Loew).—As usual, very troublesome in the Valley, spoiling much fruit. Some growers report being without it since the hard winter of 1915-1916.

*The Gooseberry Sawfly* (**Gymnonychus appendiculatus** Hartig).—More than usually abundant, and some cases of total stripping were seen. Much parasitized in the later generations.

*The Tarnished Plant Bug* (**Lygus pratensis** L.).—Common but not in epidemic numbers.

*Hewitt's Leaf Roller* (**Cacoecia hewittana** Busck).—Somewhat troublesome this year, especially on currants.

*Imported Currant Borer* (**Synanthedon tipuliformis** L.).—This insect is becoming more troublesome and is often the cause of sickly looking bushes. From its hidden manner of working it often escapes observation.

*The Loganberry Crown Borer* (**Bembecia marginata**, Harris).—This insect works freely on blackberry, raspberry and the wild thimble berry (**Rubus parviflorus**), but in no case does it cause so much trouble as on the loganberry, where it is a serious pest and one difficult to control.

*The Raspberry Cane Maggot* (**Phorbia rubivora**, Coquillett).—This insect is frequently seen in the raspberry plantations but not in serious quantity. Both this insect and the previous one, should they become more

numerous, would be a serious trouble to the small fruit grower and would present a difficult problem to the economic entomologist in their control. That this is more than a mere possibility is to be apprehended from the fact that they were only listed as suspects by Mr. Treherne in 1914, whereas they are now generally distributed and frequent. Their continued increase would give rise to the situation just mentioned.

*Rose Scale* (***Aulacaspis rosae***, Bouche).—This was met with occasionally on all cane fruits and roses, but chiefly on blackberries. It may be controlled by a lye wash in winter and by cutting out the badly affected canes. Only where neglected is any damage done.

*Elm-Currant Aphis* (***Schizoneura ulmi*** L.)—This interesting species was collected at Chilliwack in the fall of 1920 by Mr. W. H. Robertson, Provincial Horticulturist. It is a double host aphid of European origin, alternating between the English elm (***Ulmus campestris***) and currants or gooseberries, but this is the first record of its occurrence on the currant in America.

Dr. Edith Patch, in Maine, and Mr. W. A. Ross, in Ontario, have found it rarely on elm.

In England it has been noted doing damage to young currant bushes in the nursery row, where it forms colonies on the roots after the style of the woolly aphid of the apple in its subterranean forms.

Beside the Chilliwack outbreak, bushes located at Agassiz were found to be infested, and I made this year some preliminary observations on its life history.

My first note is the finding of the stem mother with a numerous progeny in a typical leaf curl on English elms on the Experimental Farm at Agassiz. American elms are not touched by this species; the leaf curls on this latter tree being caused by "*lanigera*" or "*americana*." The lice in these leaf curls produced winged migrants and were empty by June 20th, when on July the 5th, I found the commencement of the summer cycle on the black currant roots on the farm. These were situated at varying distances of from 50 to 200 yards from the elms. These apterous generations continued to increase and spread over the whole root system of the currants until September, when the winged form again appeared and returned to the elm for egg laying. This is an insect that will have to be watched, especially in its effect on nursery stock. In its present abundance it probably does but little damage to established plantations, but, should it increase, the problem of its control would be as difficult as that of the somewhat similar grape **phylloxera**, with the added difficulty that the returns from its small-fruit hosts do not admit of an expensive method of control being applied.

Experiments with soil insecticides carried on at Agassiz this year were not successful. Nicotine sulphate was the most promising, but failed to penetrate to the depths at which the lice were found.

When digging the young stock in the fall for distribution, the lice may be cleansed from the roots by dipping in nicotine sulphate without injurious effects.

**Aphids in general** were kept well in check this year by natural control, and many species of regular economic importance were a negligible quantity, as far as my observations went. The apple-grain aphid was in very small quantity on either host and was heavily parasitized all summer by a small hymenopteron. Coccinellids and Syrphids were abundant this year and kept all species in check effectually.

Amongst insects of general importance, several species of sawfly, especially on roses, were more than usually abundant, whilst the opposite extreme was attained by the Red-legged locust (**Melanoplus femurrubrum**), whose numbers were very small after a period of abundance for three years. It would be interesting and useful to know the exact causes of these fluctuations.

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## THE RELATION OF BOTANY TO ENTOMOLOGY

BY W. B. ANDERSON, VICTORIA.

In offering you these few remarks, I do not purpose going deeply into my subject, nor have I made this paper too long. It is, in a way, a filler-up, as so many of our older members seem to have given up the writing of papers for these meetings, for the entertainment or the instruction of such of us as have had less time or fewer opportunities for systematic collecting. This is much to be deplored, for to the existence of this Society we are indebted to the zealous efforts of the older Provincial Systematists, and it is to be hoped that another year will see more of our old friends, and again hear from them of some of their delightful and entertaining experiences.

I have taken for title, "The Relation of Botany to Entomology," and propose to show, in so far as I am able, the value of a knowledge of Botany to the collector.

Among Economists, this is being demonstrated every day, in most cases quite unwittingly. As, for example, a searcher for the Codling Moth goes through apple orchards; for the Leaf Slug, among the cherries and pears. For the Vine Weevil among grapes, strawberries and primulas. So with other pests which harry the soul of the orchardist or the farmer, or gardener. But everyone knows the trees and plants just named, and the average Economist, were he to find any one of the pests enumerated on any other host plant but those he has been accustomed to associate with the particular insect, will be quite at sea, and unable to name the plant without collecting specimens and submitting them to someone of Botanical knowledge.