

some of our well known older members, whose contributions I am sure would be most welcome at the annual gathering, and I sincerely hope they may favor us with some notes or observations for our next meeting.

Most of us remember the papers which always used to be read at the annual meetings of the Parent Society from the pen of the late Dr. T. Fyles, with their pleasant conversational features recording his field notes each season. A few papers like these would do much to popularize the study of Entomology, and this is something much to be desired if we are to continue and flourish as a society. I have in mind an old friend of mine in Manitoba who began with a cigar box collection and who is now an active and valuable economic entomologist in the service of the Dominion. Our dear old friend Dr. Fletcher always made a point of encouraging and assisting the boy or girl collector who wished any information about the insects they captured.

The various members who specialize in the different orders are continuing their work and adding to our knowledge of the insect fauna of the Province. To mention a few, there are: Mr. Blackmore (Micro Lepidoptera); Mr. R. S. Sherman (Diptera); Mr. Downes (Hemiptera); Mr. Glendenning and Miss McDougall (Aphididae); Mr. Buckell (Orthoptera); etc., besides several general collectors.

I do not wish to trespass any longer on your time with these more or less disjointed remarks. You will have much more valuable information to listen to in the various papers to be read, and I will therefore conclude by wishing you all the utmost prosperity during 1925, and expressing the hope that our discussions at this session may prove of much value to the members of the B. C. Entomological Society, and also to the Province as a whole.

PANSY SPOTS ON APPLES
(A Peculiar Form of Thrips Injury.)

BY E. P. VENABLES

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The attention of those engaged in the production of apples in the North-Western United States, and also in British Columbia, is frequently attracted to certain peculiar yellowish-white blotches upon the skin of the fruit, each blotch bearing in its centre a distinct dark puncture. It is not uncommon to find as many as fifteen or more of these blemishes upon a single fruit. The term Pansy Spot has been applied to this trouble on account of the similarity in appearance of many of the spots to the bloom of a pansy.

A considerable amount of culling may take place when these spots are numerous, although it has not been demonstrated that any actual injury is caused to the underlying tissues beneath the spots, which are confined to the extremely thin outer skin of the fruit.

The cause of this trouble was in doubt up to the year 1921, various insects being held responsible. Leaf-hoppers, aphids, and various plant bugs had been under suspicion, but no definite evidence incriminating any one class of insect had been forthcoming. In that year Mr. E. J. Newcomer, of the United States Bureau of Entomology, was successful in showing that thrips were evidently the cause of Pansy Spot. Mr. Newcomer's findings were set forth in an article in the October number of "Better Fruit," 1921, under the title "A Thrips Injury to Apples," and therein is contained the first correct diagnosis of the trouble, based upon the finding of thrips eggs within the central punctures of spots upon apples.

From observations made by the writer in 1920 and 1921, at the instance of the late Mr. R. C. Treherne, at that time in immediate charge of entomological work in British Columbia, it was inferred that the primary injury causing the spotting of the fruit took place at some time prior to the closing of the calyx, and possibly before the petals had fallen. This supposition was supported by the facts that many young fruits showed typical spotting at the time that the petals were falling, and that both adult and larval thrips were present within the calyx at that time, their presence indicating that eggs had been deposited within the flower parts, and upon developing apples.

In 1922 and 1923, careful observations of both blossoms and fruit resulted in the finding of undoubted thrips eggs, both in the pistils of the blossom and in many of the spots upon the apples. The eggs appear as minute, kidney-shaped objects of a translucent appearance. The presence of eggs within the pistils is usually indicated by small, dark brown punctures upon the surface of the style; the eggs are quite difficult to locate when placed in this position. Eggs deposited in the skin of the apples lie in small cavities, with the end of the eggs flush with the surface. As development progresses, the eggs swell up, and the red eyes of the larvae are clearly visible within.

After the eggs have hatched, there is a well-defined but minute slit in the skin of the fruit, marking the position occupied by the egg; this puncture gradually heals over, leaving a small, dark point, surrounded by a yellowish-white spot.

In order to secure definite evidence as to the class of insect concerned with this type of injury, a number of blooms, the styles of which showed typical egg scars, were selected. The petals and stamens were cut off, leaving the pistil and fruit intact, the stalk being thrust into a cork which

was inserted in a vial. This arrangement held the fruit clear of the glass and allowed of easy examination. Fruits isolated in this manner produced from 1 to 6 larvae each between May 23 and May 30.

In another series of experiments, young apples, showing typical spotting, were isolated in the same manner. These had all the flower parts removed, leaving the fruit itself as the only source from which larvae could emerge. From these, larval thrips were secured between June 6 and 15. Unfortunately none of these larvae were bred through to adults.

In 1922 the first larvae were found within the calyx of crab apples on May 20, the trees being then in full bloom. On May 22 larvae were found commonly, and varied in numbers from one to as many as six or eight individuals within a single calyx. The calyx cavity apparently offers an ideal condition for feeding and concealment during the early development of the insect. No eggs have been noted within the stamens, although these organs show evidence of feeding by the thrips.

As soon as the petals fall, and the essential organs commence to dry, the thrips abandon the calyx and migrate to the nearby flowering weeds and leguminous plants. A few individuals may be found during the summer within the tender, unfolding leaves of the terminal growth of apple trees. The insects swarm upon tumbling mustard, during early June, and eggs occur within the blossom stalks of this plant. Alfalfa plants harbour numbers of thrips during the whole summer, and reproduction is known to take place upon this plant.

Thrips occur, also, within the blooms of plums and prunes, although no definite injury has been noted to this class of fruit.

The spotting of the fruit produced by thrips' oviposition will persist in certain varieties of apples until picking time, and it is usually at this period that the attention of the grower is first called to the trouble. The persistence of the spots upon the fruit varies with different varieties, many of which, such as crabs and Wageners, which may harbour numbers of thrips during the blooming period, and which will show numbers of blemishes in the early summer, practically outgrow the injury by the autumn. On the other hand, some of the leading varieties, including McIntosh Red and Northern Spy, are particularly susceptible.

Typical Pansy Spot also occurs upon grapes and tomatoes, the spots being identical in appearance to those found upon apples. Extensive collections of thrips taken from apple bloom have shown that **Frankliniella occidentalis** Prg. is by far the most prevalent species, and there can be but little doubt that this insect is responsible for the injury commonly termed Pansy Spot. The species also represent the bulk of our collections from plants growing throughout the orchards. Both **Aelothrips fasciatus** Ling. and **Aelothrips conjunctus** Prg. have been taken from

apple bloom. An unidentified species of **Taeniothrips**, possibly **T. vulgattissimus**, also occurs, but to a lesser degree. It is probable that these species have no connection with the fruit injury. In fact, according to the late Mr. R. C. Treherne, to whom I am indebted for the identification of the species mentioned, they are doubtless predacious upon **Frankliniella occidentalis** Prg.

Frankliniella occidentalis is undoubtedly a species of considerable economic importance. The insect has been shown by Mr. H. L. Seamans, of the Dominion Entomological Branch, to cause heavy losses in those areas of Alberta specializing in alfalfa seed production. In an article he published in *The Canadian Entomologist*, May, 1923, he states that as many as seven generations may be produced in a single season upon alfalfa.

The growing of alfalfa as an orchard cover crop in certain sections of the dry belt of British Columbia may have some bearing upon the prevalence of Pansy Spot in those sections. The late Mr. Treherne, during his residence in the Province, drew attention to the possibility of thrips being active agents in the dissemination of fire blight during the blossoming period. The preference shown by these insects in ovipositing and feeding within the blooms has undoubtedly a direct bearing upon this question. Control measures have not as yet been deemed necessary, but where McIntosh, Northern Spy and perhaps Jonathans are grown, they may be considered advisable. Standard thrip sprays applied during the pink stage would undoubtedly help to reduce the injury.

LACE BUGS OF BRITISH COLUMBIA

BY W. DOWNES

To the casual observer the members of the order Hemiptera, or bugs, possess no especial attraction. They are associated in the mind with the flat-bodied evil-smelling creatures that not infrequently infest ill-kept hostleries and tenements, or with the large Pentatomids or stink bugs whose nauseating odour left behind by them on raspberries and blackberries is familiar to us at fruit picking time. And even some naturalists, unless they be also entomologists, are unaware of the variety of strange and beautiful forms possessed by this order of insects, the majority of which, like those that are the subject of this paper, are far removed in appearance from their cousins of malodorous notoriety.

The members of the family of Lace Bugs or Tingidae are among the most unique and beautiful of our insect fauna. They are easily recognized by their gauze-like, reticulated wings, the peculiar hood over the head and the broad lateral expansion of the prothorax, suggestive of an