

FIFTY YEARS OF ENTOMOLOGY ON VANCOUVER ISLAND

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It is to be feared that this account will resolve itself mainly into a history of the work of the Victoria Laboratory. While the entomological events of the past thirty-five years can be related by me from personal observation, those of the previous fifteen can be gleaned only from the published reports of Government departments and those of the Entomological Society of British Columbia.

At the beginning of the century the economic importance of entomology had not attained the prominence in British Columbia that it has today, probably because pests were somewhat fewer and some of the more destructive ones, such as the codling moth, had scarcely arrived. There were no government entomologists in British Columbia and insect outbreaks were dealt with as best they could be by the fruit inspector and district horticulturists. It is evident, however, that growers were not without their troubles for in the report of the Minister of Agriculture for 1902 there were recommendations for control of cutworms, leafhoppers, aphids, red spider, cabbage butterfly, pear and cherry slug, June bug, oyster-shell scale, woolly aphis, tent caterpillars, peach tree borer, onion maggot and raspberry root-borer. In the same year there is reference to a heavy infestation of the oak looper, *Lambdina fuscicollis somniaria*, in the Uplands and Lake Hill districts of Vancouver Island and to an army of caterpillars of *Nymphalis californica* in the Grand Forks district of the mainland, the only insect outbreaks which are mentioned.

The Entomological Society of British Columbia had been founded in 1901 by a few amateur entomologists who were principally interested in collecting Lepidoptera and Coleoptera and the early publications of the Society contain no references to insect outbreaks. The members were principally

concerned in collecting and cataloguing the orders in which they were interested. Short lists of Lepidoptera, Coleoptera and Diptera were published in 1906 to 1908 in the Society's "Quarterly Bulletins" and a list of Lepidoptera of British Columbia was compiled by E. M. Anderson of the Provincial Museum, and published by the Society in 1904. A corrected list citing 1061 species was published two years later.

In the early years of the Society the membership was small. Twenty-one members were listed in 1906 and seven years later the number was only twenty-four. Interest gradually waned and no meetings appear to have been held in 1909 and 1910. But in 1911, the late R. C. Treherne was appointed Entomologist-in-Charge by the Dominion Government with headquarters at Agassiz. He immediately set to work to instil new life into the somewhat moribund Society and the result of his efforts was immediately apparent. Treherne possessed a charming, magnetic personality and had the quality of transmitting his enthusiasm to others. The Society appointed him Secretary and he immediately commenced a drive for members, raising the membership from 24 to 101 in a single year. More than that, he succeeded in obtaining from the Provincial Government a grant of \$250 a year, on the understanding that papers on economic entomology were to be published in the Society's Proceedings. It was about this time that the centre of the Society's activities settled in Victoria, and for several years the annual meetings were held there. Besides the resuscitation of the Entomological Society the arrival of Reginald Treherne was followed by a burst of activity in the economic field of entomology.

During these years insect pests appear to have been giving agriculturists and horticulturists more trouble

than formerly. Outbreaks of codling moth appeared at Royal Oak, the first of which was said to have been dealt with by the rather drastic method of cutting down the affected trees. The cure does not seem to have been permanent because, in 1914, we find that the Department of Agriculture was engaged in a spraying campaign against codling moth on the Island. This was to have been continued in 1915, but in that year an event occurred which resulted in the permanent establishment of an entomological laboratory on the Island. This was the discovery of pear thrips at Royal Oak. The insect was recognized by Treherne who sent specimens to Ottawa. Gordon Hewitt, Dominion Entomologist, immediately ordered a control campaign to be undertaken against the pest. A. E. Cameron was sent from Ottawa to conduct the investigation and Treherne temporarily closed the Agassiz Laboratory and moved to Royal Oak. A field laboratory was set up in an old barn in the Brydon orchard at Royal Oak and life history studies and spraying experiments were carried out in 1915 and 1916. The result of these was highly satisfactory, the production of the orchard rising from a few hundred boxes at the beginning of the investigation to about 6,000 in 1916. Early in 1917 Cameron returned to Ottawa, Treherne returned to Agassiz, and I was engaged to complete the life history studies of the pear thrips and report upon any other insect troubles which developed.

I should mention here that, in addition to the thrips laboratory, natural control investigations were being carried out by John D. Tothill at Royal Oak. Mr. and Mrs. Tothill remained at Royal Oak for two seasons, during which Tothill was engaged in the study of parasites of tent caterpillars. One of the objects of his visit to British Columbia was to collect puparia of parasites, especially *Blepharipeza*, a tachinid fly, for shipment to eastern Canada. He conceived the idea of introducing the beetle *Calosoma sycophanta* to British Columbia for the purpose of keeping down tent caterpillars and

oak loopers. One shipment of these was released in 1917 at Royal Oak by Tothill and another by myself at Victoria a year later. These releases constituted, I believe, the first attempts at natural control by introducing predators in British Columbia. The experiment, however, was not a success as the life history of the beetle did not synchronize with that of either the tent caterpillar or the oak looper and the beetles failed to become established. About this time also, R. Glendenning was engaged in conducting a survey of the currant bud mite situation on Vancouver Island. As the result of his investigations an attempt was made to eradicate the mite and a large number of infested bushes were rooted out.

It was during these years that the strawberry root-weevil came into prominence. During the previous decade the small fruit industry on Vancouver Island had been developing rapidly. The price of fruit was high and the growers, not understanding the habits of the weevil, conducted the culture of strawberries under conditions which gave the pest every opportunity to increase. Such heavy infestations occurred that it was not unusual for newly planted fields to be wiped out in a single season.

The growers apparently were able to obtain little help from the Provincial Government and with the success of the pear thrips investigation in their minds, they petitioned the Dominion Government to send an expert from Ottawa to study the problem of the weevil. Nothing was done until September 1918 when Gordon Hewitt visited Vancouver Island and, together with Treherne and myself, attended a growers meeting at Keating. Feeling appeared to run very high, the growers believing that the government had let them down, and among the more ignorant members of the community there was a feeling of antipathy to government "experts." Treherne, who for some years had studied the weevil on the Mainland, addressed the meeting, outlining the life history and giving the then known

methods of control. He had not been speaking long when a man arose at the back of the hall and shouted—"Yes, you tell us that, but we don't believe a word of it." Hewitt jumped to his feet and said, "We are not here to listen to remarks of that description and we will withdraw immediately from this investigation unless you accept what we tell you as the truth." The meeting quieted down and concluded peaceably. It was arranged that I was to study the strawberry root weevil on the Island as the main project until a method of control that was satisfactory to the growers was worked out.

During the succeeding years experimental work against the strawberry root weevil continued to the exclusion of almost everything else and a great deal of co-operation was received from the growers. Only among a certain ignorant minority the old antipathy to government men persisted. This was evidenced during a meeting which I was addressing at Gordon Head. After I had described the life-history of the strawberry weevil, an old fellow arose and said—"Tell me, professor, can that weevil fly?" I said, "No, it cannot fly, it has no wings." "Now I *know* you're a liar" the old man shouted triumphantly, "because I've seen hundreds of 'em flying all over the place."

In 1919 it was decided to close the Royal Oak field laboratory and the Provincial Department of Agriculture provided us with an office in the Parliament Buildings. This was a cubby hole in one of the turrets, measuring about 6 ft. by 8 ft. and when the entomologist's table, bookcase and chair were installed there was just about room for the entomologist to turn round. However, this was the best they had to offer, and we occupied these palatial quarters for eight years, the only change being to another cubby hole of equal size in another turret. In 1920 I was joined by an assistant, R. Glendenning, and, in addition to strawberry root weevil control, studies of other small fruit insects, Hessian fly and the satin moth were commenced, the latter having

just made its appearance on Vancouver Island. In 1921 Glendenning was transferred to Agassiz to take charge of the entomological laboratory and for two years no assistant was appointed for the Victoria laboratory.

During the succeeding five years the control of the strawberry root weevil continued to be the principal project upon which we were engaged at Victoria and strenuous attempts were made to solve the problem by means of weevil-proof barriers. Treherne had already tried this method without success but his tanglefoot barriers were poorly constructed and soon became ineffective. In fact Treherne was pessimistic about the whole project and writing to me in 1919 he says—"I have tried all those suggestions of yours, and if there is anything I have not tried, I would like to know what it is." However, it was decided to give the barrier method another trial and at Gordon Head, I enclosed ten acres of strawberries with a well-made wooden barrier with a tanglefoot band. This was a success in regard to keeping the weevils out, but the tanglefoot band required frequent attention or it soon became ineffective, and, in fact, the whole contraption was unwieldy and a nuisance. A more effective barrier was devised by using heavy lumber with a wide groove ploughed in the upper edge; the groove was filled with crude oil. This needed little attention and provided good protection, but like its predecessor it was clumsy and was soon discarded. The best barrier of all was found to be a wooden barrier with an overlap of tin. This required no attention and was applicable to any situation. Until the invention of the poisoned bait method, these barriers were widely used on Vancouver Island, but were quickly discarded as soon as the more practical method of control by poisoned bait was devised.

When at Royal Oak I had observed that strawberry root weevils seemed to be attracted by partly decayed windfall apples, but an attempt to attract them by means of fresh chopped

apples was a failure. In Seattle, however, J. Forsell, a Washington County Agent, hit upon the idea of using evaporated apples as a bait and this was immediately successful. The poison used was magnesium arsenate, but while this was an effective killer, it became hygroscopic in the presence of the apple and the bait became sticky and unusable. At Victoria we substituted sodium fluosilicate and this proved greatly superior, the bait being not only more attractive but giving a better kill. The comparative trials made at Victoria were published in the *Canadian Entomologist*.

Forsell had patented his invention and evidently thought he had the strawberry growers over a barrel. He attempted to market his product at an exorbitant price, but was immediately met by substitute baits in Washington and elsewhere. At Victoria we devised a superior bait which did not infringe Forsell's patent. Spoiled raisins were used as the attractant and proved superior to apple. In those days quantities of raisins which had been on the grocers' shelves too long and had become wormy or candied, could be obtained for as little as six cents a pound. (The raisins were gathered up by the raisin company's agents and put through cleaning machines to remove the worms and then were sold in barrels to bakers who used them in raisin bread.) The raisin bait was used exclusively on Vancouver Island but eventually failed through the uncertainty of the supply of raisins, but it was used with great success in New York State against the alfalfa root weevil in 1926.

Other projects about this time included control of the narcissus fly and the two means of control which we experimented with at that time, crude naphthalene as a repellent and oil emulsion spray are still the most effective today.

In 1923 Kenneth F. Auden was appointed assistant at the Victoria laboratory. At that time the rose leaf roller, *Cacoecia rosana* was giving much trouble in gardens and orchards and we were devoting some time to the

study of its life history and control at a small orchard in the outskirts of Victoria. This minor project was given over to Auden for attention. It seemed to me that my assistant used to return every day with very slight information about the habits of the pest and I wondered why, until I discovered that next door there were two very pretty girls who took an unusual interest in the life history of leaf-rollers and entertained Auden with tea on the lawn every afternoon. When the experiment was transferred to a less attractive location progress was more satisfactory. However, Auden had the making of an excellent entomologist, being a keen observer and a good collector with a capacity for surmising accurately where a species was likely to be found and he seldom returned from a collecting trip without valuable material. He left to go to Northwestern University in 1926 and his death shortly after was very regrettable.

In 1927 John Stanley was appointed assistant at the laboratory. We were then very busy with the European earwig, experimenting with poisoned baits, and as the City of Victoria was conducting baiting campaigns every year in an endeavour to keep the earwig down, we had to survey the city for infested areas. Stanley and I were surveying a district adjacent to Ross Bay cemetery one evening, the method being to examine garden fences with a flashlight, and if a single earwig was found that block was considered infested. Rounding a corner I was suddenly seized by a policeman who wanted to know what I was doing. Explanations followed and the policeman said he had been called to the district by a woman who said she had seen two ghosts, all in white, coming out of the cemetery and one of them had a bright shining eye in the middle of his forehead! That, however, was not the last of it, for on the front page of the *COLONIST* next morning this appeared in large headlines—"Ghosts coming out of the cemetery resolve themselves into the persons of harmless entomologists."

It was quite a while before we heard the end of that.

John Stanley was an excellent assistant. He later went to Minnesota and afterwards, with Chapman, to Hawaii. He is now a professor at McGill. He was followed in 1928 by Geoffrey Beall. Geoffrey was fond of studying ants and, as at this time the Provincial Department of Agriculture had moved us from the aforesaid cubby hole to a large room in the annex behind the Museum, he was able to have ample room for his pets. He had been told that ants would not cross a barrier of lime so a barrier of slaked lime was built on the floor and a lively colony of ants thrown into the middle. The ants spent most of their time trying to get out and most of Geoffrey's time was spent trying to keep them in. Of course, the inevitable happened. In the night the ants broke down the barrier and wandered off into adjoining offices. In the morning there was serious trouble: the ants were busy climbing up the stenographers' legs and Geoffrey Beall and myself were far from popular. This episode, however, resulted in our being moved to more commodious premises. The authorities decided to segregate us and, as an old dwelling was available at the rear of the Parliament Buildings, we were given three rooms on the upper floor. The rooms were cleaned and renovated and are still occupied by my successor, Harry Andison. Geoffrey Beall later went to the laboratory at Chatham, Ont. He took his doctorate and was in charge of the laboratory for several years. Later he moved to the United States and is now engaged on commercial work.

It will be necessary to pass over the next few years rather quickly. From 1928 to 1933 we were engaged in studying the control of the cherry fruit worm, *Grapholitha packardii*, which was becoming very destructive among sour cherries. Also an endeavour was made to determine if berry blight, *Haplospheeria deformans*, on logans and raspberries was conveyed by insects. Both these projects entailed extensive field work. A good control for cherry

fruit worm was found by spraying for the eggs with summer oil—nicotine spray. No conclusive results were obtained in the berry blight experiments. Other projects included holly leaf miner, earwigs and *Merodon equestris*.

From 1934 to 1939 the chief project at the Laboratory was rearing the earwig parasite, *Digonichaeta setipennis*. Chester Smith came from the Belleville parasite laboratory to get the rearing started on a sound basis and remained with us for three months. Harry Andison was appointed assistant at the Laboratory and J. Aldous a year later.

The rearing and distribution of earwig parasites occupied our attention over the next few years until the end of 1939. The first year the output was 30,020; in 1936, 77,157, and in 1938, 120,056. In the same years we received and distributed hymenopterous parasites of the holly leaf miner, of which two species have become established. In 1936 and 1937 Andison conducted successful experiments against *Scirtothrips longipennis*, a thrips destructive to begonias in greenhouses; experiments were conducted against *Merodon equestris* and some work done in connection with codling moth which again was troubling the growers on the Saanich Peninsula. In 1938, and again in 1939, the cherry fruit fly, *Rhagoletis cingulata*, which had appeared a year or two before, caused serious loss to cherry growers and spraying experiments were conducted against it. This was the first recorded occurrence of this species on Vancouver Island. An attack of cherry fruit fly is said to have occurred many years ago just outside Victoria, in an orchard at Lake Hill which was owned by the late R. M. Palmer, but the species in that case was *Rhagoletis fausta*.

In 1938 a pest new to North America appeared at Victoria. This was *Sitona lineatus*, a small grey weevil destructive to peas and beans. Very good control was obtained by dusting seedling peas with 10 per cent. DDT dust.

About this time, too, we discovered another pest new to North America.

This was the apple sawfly, *Hoplocampa testudinea*. It attacks the young fruit when about an inch or so in diameter, causing it to fall to the ground. Experiments against this pest were conducted in 1940, 1941 and 1942. Excellent control was obtained by spraying with summer oil emulsion and nicotine sulphate just after the petals had fallen. We obtained far better results with this spray than have been obtained in England with nicotine alcaloid.

The year 1940 marks the commencement of far greater expansion of entomological activity on the Island than in former years. In this year the Dominion Division of Entomology decided to establish a Forest Insect Laboratory at Victoria and appointed M. L. Prebble to the position. Prebble remained in Victoria for five years, establishing the laboratory and organizing the work. He then left for Sault St. Marie and was succeeded by H. Richmond who is in charge at the present time. The work of this laboratory extends over the entire Pacific Coast of British Columbia and the Queen Charlotte Islands. Much of the work consists of surveying timber areas, reporting and scouting insect outbreaks, advising operators as to control measures and the study of life histories of forest insects and potential pests. Millions of seedlings also are raised for reforestation. A staff of about 20 is maintained with many more engaged on seasonal work. A sixty-foot motor vessel is used for transporting the men and their equipment to and from areas on the coast where their work is situated. Richmond's offices are in the Post Office Building.

In 1946 Kenneth King arrived in Victoria from Saskatoon to establish a laboratory for the study of vegetable insects. The establishment of such a laboratory relieves the original Victoria laboratory of a portion of its load, for although nominally a fruit insect laboratory, it has had to handle every kind of insect problem except forest insects. King and his staff are currently engaged in the study of

root maggots and wireworms with especial attention to the differentiation of larval forms. A staff of four is maintained, with offices on the second floor of the Belmont Building. Much progress has been made in the study of root maggots and their control. In addition to identifying the larval forms of indigenous species of wireworms, certain introduced species have been identified.

Returning now to the Victoria Laboratory and its work in 1941 and 1942, sufficient earwig parasites had been reared and distributed by that time to establish the species wherever earwings were found in British Columbia. We were then able to turn our attention to a pest which had been troublesome for many years, the June beetle, *Polyphylla perversa*. While formerly it had occurred occasionally and sporadically, sometimes injuring strawberry plantings to a slight extent and sometimes wiping out a quarter of an acre at a time, it now appeared to have established itself as a pest whose annual depredations could be considered inevitable. In fact it had become pest No. 1 to the small fruit grower. In 1943 it was decided to lease a plot of two acres, plant it with strawberries and use it as an experimental ground for June beetle. With the consent of the Department of Agriculture this was done and an agreement entered into with the Saanich Fruitgrowers Association whereby they agreed to supply a certain amount of labour for ploughing and cultivation.

Unfortunately this was a most unfavourable time for starting an enterprise of this sort. These were war years and help of any description was almost impossible to obtain. Anderson had been temporarily transferred to Vernon and, with a major project on my hands, I had to manage as best I could. Much of the planting, weeding and cultivation was done by myself with occasional assistance from very unreliable local help and even the stenographer was pressed into service now and then for weeding and hoeing.

But, notwithstanding these difficulties, the plot was kept going somehow and tests were made with certain soil insecticides. An extensive trial was made of a method of using lead arsenate at planting time which was stated to have been very effective against white grubs in the east. But the tough Western June Beetle proved immune to arsenic and was equally scornful of DDT. Other insecticides also gave negative results.

The control of the holly leaf miner which had baffled us for so many years, was solved in 1946 by spraying with DDT just prior to the emergence of the flies in the spring.

Later in 1946 Anderson became officer-in-charge of the Victoria laboratory and continued the experiments with soil insecticides against the June Beetle. Experiments were commenced with ethylene dibromide—DD mixture, benzene hexachloride and chlordane. An apparatus was devised at the laboratory whereby liquid insecticides could be dropped in the furrow behind the plough. The experiments were continued through 1947 to 1949. The result of these tests is considered highly satisfactory. Benzene hexachloride at the rate of one pound of gamma isomer per acre gave excellent control of white grubs and there is evidence that it also prevents the females from depositing eggs. Chlordane gave good control of the larvae of the strawberry root weevil. Efforts are now being made to find a soil fumigant that will be effective against the white grub and the strawberry root weevil at the same time and there is some prospect that this will be found.

Other successful investigations carried out during these years were in connection with field control of narcissus fly, western raspberry fruit worm and the leaf hopper *Typhlocyba tenerrima* on logans and raspberries.

Up to the present I have made only slight mention of the systematic side of entomology. In the early days of the Entomological Society many of the members collected extensively on Vancouver Island. The Rev. G. W.

Taylor, the founder of the Society, collected Lepidoptera extensively. His collection of Geometridae was purchased by Wm. Barnes of Decatur, Ill., but the balance of his collection was neglected after his death and in time was destroyed by pests. The late G. O. Day and A. W. Hanham were also collectors of Lepidoptera, the collection of the former being particularly fine, every specimen being perfect. He had also a collection of British butterflies and moths representing every known British species. At his death these collections were bequeathed to the Shawnigan Lake Boys' School, where I am told they are neglected and gradually becoming a prey to museum pests. Besides Lepidoptera, Hanham collected Coleoptera and after his death his collection became the property of the Victoria Museum. E. M. Anderson of the Museum staff was a keen lepidopterist and published a list of British Columbia Lepidoptera in 1904. The late E. H. Blackmore accumulated a large and valuable collection of Lepidoptera. At his death most of this was purchased by the University of British Columbia, but some of it was acquired by the United States National Museum. G. A. Hardy of the Victoria Museum is an enthusiastic student of Coleoptera, especially Cerambycidae and he has collected extensively on Vancouver Island.

In 1916 when the pear thrips campaign was under way, the late R. C. Treherne commenced a collection of Thysanoptera, mostly of Vancouver Island species. Treherne published several papers on Thysanoptera in the Society's Proceedings. After his death his collection was transferred to the Canadian National Collection. E. R. Buckell studied the Orthoptera of British Columbia and in 1930 published a list of the Dermaptera and Orthoptera of Vancouver Island in the Society's Proceedings.

The Order Hemiptera seems to have been neglected by our entomologists, though a few collectors like Hanham and J. H. Keen preserved specimens of Hemiptera when they came across

them. It was at the suggestion of R. C. Treherne in 1917 that I commenced a collection of Hemiptera since no one else at that time seemed willing to take up the study of that order. This collection now numbers about 14,000 specimens mostly from Vancouver Island. Nearly all species recorded from British Columbia are represented. Long series, however, cannot be kept for lack of space. About the year 1935 serious collecting had to be abandoned through lack of time to attend to systematic work, but lately has been resumed. A very imperfect list was published by me in 1927 and it is planned to produce a new list in the not too distant future.

Finally, in recent years, Mr. Llewellyn Jones of Cobble Hill created his fine collection of British Columbia Lepidoptera. In respect to the beautiful condition of the specimens Mr. Jones' collection rivals that made years ago by Mr. Day and is much larger. It forms the basis of a new list of British Columbia Macrolepidoptera which is just off the press. We understand that this fine collection will be presented to the University of British Columbia and together with the Blackmore collection the University should possess one of the finest collections of Lepidoptera in the West.

I would like to close this review of 50 years of entomology with a word of appreciation for the co-operation and help that has been received from the Provincial Department of Agriculture. About the time of Treherne's appointment an agreement was made between the Dominion and Provincial Governments that all entomological research in the Province would be conducted by the Dominion Government and the Province would provide laboratory space where no Federal building was available, as at Victoria and Vernon. Over the years, the entomologists at Victoria have had reason to be grateful for this arrangement, for the Provincial Department of Agriculture not only gave office space, but for 27 years provided a stenographer as well. In addition, the services of the Department's mechanics were always available when required and, in short, the Department did all in its power to supplement the meagre facilities of the laboratory. Towards the Entomological Society the Department has always extended a helping hand and it is principally due to this support that the Society has been enabled to print its Proceedings since the Government grant was withdrawn. With such a spirit of co-operation prevailing, the entomologists of British Columbia may look forward with confidence to the future.

REMINISCENCES OF FIFTY YEARS OF ENTOMOLOGY IN THE LOWER FRASER VALLEY OF BRITISH COLUMBIA

R. GLENDENNING

Agassiz, B.C.

These notes make no attempt to be a review of applied entomology; fifty years of such a subject compressed into one paper would be much too long. In addition, excellent accounts of early entomology in this province are available in our Proceedings. The chief of these are G. O. Day's presidential address, and an article by R. C. Treherne, both in No. 4 published in 1914, and a further review by Treherne in No. 13 published in 1921. These give a clear picture of the start

of entomology, both systematic and applied up to 1920; they make interesting and profitable reading. So, instead of a tabulation of workers and their problems, I will recount some reminiscences of persons and incidents that may help you to envisage the past. In re-reading the various reviews already published, many memories are revived and personalities re-born, and one realizes the remarkable developments of entomology in the past 50 years—from the limited