

NATURAL CONTROL INVESTIGATIONS IN BRITISH COLUMBIA

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The forest tent insect (*Malacosoma disstria*) has an egg mass of approximately 200 eggs. In areas where it is maintaining about the same numerical strength during a short term of years, it is obvious that on an average only a single pair of moths can come to maturity from each mass of eggs. This means, of course, that about 198 of the 200 eggs in each mass fail to do so.

With the direction of Dr. C. Gordon Hewitt, the Dominion Entomologist, an investigation in the natural control of insects is being carried on, and the writer is undertaking the study of the causes of this stupendous mortality in the case of a very few of our common injurious insects.

One of the chief causes of mortality, or causes of control, has proven to be parasitism and predatism by other insects. Indeed, in the host insects studied, insect foes have shown themselves to be the chief regulators of control; for unlike birds, inclement weather, and epidemics of bacterial and fungus diseases, they increase and decrease with their hosts.

The importance of such insect predators and parasites in the control of insect pests has been recognized for many years, and already some very practical uses for them have been found. The citrus industry of California owes its vigour to the introduction from Australia of a few insignificant-looking lady beetles of the genus *Vedalia* and of a few even more insignificant-looking Agromyzid flies. The most common eastern parasite of the cabbage worm was brought here many years ago from its home in Europe. Owing to the introduction of its chief insect enemies the dreaded gypsy moth is now under infinitely better control than it was ten years ago. By thus helping insect foes of insects to cross such barriers as oceans, mountain ranges, and deserts, the disturbed balance of nature has in many cases been re-established. Such work has been carried on particularly by the State of Massachusetts in co-operation with the Federal Entomological forces in the case of the gypsy and brown tail moths, and by the State authorities of California in the case of citrus insects. The Government Entomological Service in Hawaii and entomologists independently employed by the Sugar Planters' Association in the Hawaiian Island, have been very active in similar work.

In the progress of natural control investigations in Canada it seemed probable that barriers within the limits of the Dominion were affecting the distribution of parasitic and predacious enemies of insects having a

coast to coast distribution. Certain findings in particular seemed to indicate that such was the case. For instance, a few years after the work was started it was found that useful parasites were occasionally killed out over an area as large as New Brunswick. A Tachinid parasite that for three years in succession had killed off more than sixty per cent. of the fall webworm crop (*Hyphantria*) was suddenly itself killed off by a very simple but quite natural set of conditions. The crux of the situation was that the fly had to compete with another parasite that could oviposit in wet weather. While the Tachinid flies were sheltering under leaves, their food supply was parasitized by their competitor. In another instance a light frost in June indirectly killed off the principal parasites of the forest tent (*Malacosoma disstria*). Such cases indicated that parasites present on one coast or in one locality might be absent in other places.

With these things in view the same set of host insects were studied last year in the West as had been studied for several years previously either in Massachusetts or New Brunswick.

The forest tent caterpillar (*M. disstria*) was studied at Red Deer, Alberta, and in the lower Fraser Valley. At the first of these places there has been a serious outbreak of the insect for three years, and a great deal of leaf stripping has taken place each year. In an outbreak of such long standing one usually finds that parasites of various kinds are becoming very abundant. At Red Deer, however, such was not the case, and I was unable to find a single specimen of any of the parasites ordinarily preying on this host in both the East and far West. Parasites of the right kind could be secured in great quantities at the present time from the Western Tent insect (*M. pluvialis*) on the lower end of Vancouver Island, and it seems well worth an effort to collect these for liberation at Red Deer. The only reason for the absence of parasites at Red Deer that I am able to suggest is that as the present outbreak seems to be quite isolated, it probably arose from a few moths being blown in from such a great distance that the parasites have been unable to follow. As none of the parasites are on the wing at the flying time of the moths they could reach such an isolated outbreak only by being accidentally blown to it. In their case, of course, the barrier would consist of a great area of country supporting no food material.

In the lower Fraser Valley the environment for the forest tent is exceedingly unfavourable. None of the native trees it feeds upon are abundant enough to support an outbreak, and the insect seems to be eking out a rather unhappy existence. Most of the larvae from twenty-four egg masses that I had under observation there were eaten by spiders. Though the usual insect parasites were present and even abundant, this was undoubtedly due to the great numbers of *M. pluvialis* which were suffering a great mortality from the same parasites.

In studying the fall webworm (**Hyphantria**) information was obtained, largely through material collected by several members of the British Columbia Entomological Society, concerning its control at several widely separated points in both wet and dry belts. It was found that in British Columbia a parasite is at work unknown in Eastern Canada, and that this parasite was the most important single factor in control there. This parasite is an undescribed Tachinid fly, closely related to the gypsy moth parasite **Compsilura**. Its introduction into the region East of Winnipeg will be watched with interest. In this case the great plains of the Middle West seem to have been the barrier across which the parasite has been unable to go.

Finally, I will mention just one more case of a similar kind, this time in connection with an exotic insect, the Oyster Shell Scale. In Eastern Canada, and according to Walsh, Shimer, Ewing and Webster, in the Eastern United States, the most important single factor in control of this scale is a predacious mite, **Hemisarcoptes malus**. This mite, by feeding upon the eggs of the scale, brings about an immense destruction; and besides takes at least some of the growing summer scales. Although I have been able to find this mite with little or no trouble in every one of our Eastern Provinces, a very careful search, made largely through the kindness of a number of your members, and last summer through personal observations, has failed to reveal the presence of the mite in British Columbia. If it is there at all, it is too rare to be of practical benefit, and its complete absence seems highly probable. Though it is not certain how or when the scale reached British Columbia, that it came from the East is about as certain as that it reached the East from Europe. Infested stock undoubtedly reached the Province shortly after the completion of the Canadian Pacific Railway. That the mite has not also reached the Province by the same route is a fine tribute to the splendid inspection and fumigation system consistently maintained by the Provincial and Dominion Departments of Agriculture. It may be added, in conclusion, that some experimental colonies of this mite have been liberated at several points in British Columbia, and that these will be kept under observation during the next few years.

