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The Biological Control Program Against the Larch Sawfly

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ABSTRACT

The parasite Mesoleius tenthredinis Morley was introduced from England into Canada in the years 1910 to 1913 and at first was highly successful. A loss of effectiveness in Canada was first noted in Manitoba about 1940 and was found to be associated with the encapsulation of parasite eggs by the blood cells of the host. Since then outbreaks of the resistant larch sawfly have occurred over a progressively larger area that now extends from New Brunswick to the western limit of tamarack in British Columbia.

The resistant populations of larch sawfly in Canada may have arisen due to a mutation appearing spontaneously in several regions or through the spread of the resistant strain from a locus in central Canada. This strain may have been introduced from England in 1912 and 1913 with the release of M. tenthredinis. These releases were made by placing out imported larch sawfly cocoons, some of which were not parasitized, in the field.

Evidence from infestation maps suggests that the larch sawfly can disperse at a rate of about 60-70 miles in a year in forested regions and can find isolated plantations at least 100 miles from other host stands. Larch sawfly collected recently from alpine larch near Banff, Alberta, was found to be the resistant strain. This evidence supports the hypothesis that the resistant strain has spread from a locus. The current infestations of larch sawfly on western larch in Idaho and British Columbia, however, have been found to be susceptible, indicating an origin from residual populations.

Recent experiments have indicated that M. tenthredinis from Bavaria have a greater ability to avoid or overcome encapsulation in resistant Canadian larch sawfly than the 'native' M. tenthredinis. Hybridization experiments indicate that this characteristic of the Bavarian form is transmitted as a dominant factor. Releases of the Bavarian strain have been made in Manitoba to test the possibility that a more effective strain of this parasite will arise through natural selection acting on a population having a greater degree of genetic variability than existed prior to the releases of the Bavarian M. tenthredinis.

Six species of parasites, five from Europe and one from Japan, have been released during the recent biological control program against the larch sawfly in Canada. One of these, Holocremnus sp. nr. nematorum (Tschek.), is now well established at two locations in Manitoba. Intensive studies to estimate its impact and spread are continuing.