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INTRODUCTION OF PARASITES OF THE LARCH SAWFLY IN MINNESOTA¹

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ABSTRACT

Olesicampe benefactor Hinz and the Bavarian strain of *Mesoleius tenthredinis* Morley, European ichneumonid parasites of the larch sawfly, *Pristiphora erichsonii* (Hartig), were introduced into northern Minnesota from Manitoba in 1971 and 1972. Both species are now established. There was also natural spread of *O. benefactor* into Minnesota from Manitoba releases in 1961 at a point ca. 200 miles northwest of the Minnesota plots.

Minnesota has over one-half million acres of commercial forests in the tamarack (*Larix laricina*) timber type. Although greatly under utilized, it is an important resource reserve for forest industries. The only major pest of tamarack in Minnesota is the larch sawfly, *Pristiphora erichsonii* (Hartig), a univoltine tenthredinid defoliator.

Turnock (1973) describes the larch sawfly outbreaks in central and eastern North America as "permanent types" characterized by severe, widespread and prolonged outbreaks. The parasite fauna is composed of only a few species which have little influence on the populations. Turnock points out that there was a break in this pattern lasting from about 1920 to 1938 when the introduced parasite, *Mesoleius tenthredinis* Morley, was effective. During this period the population system was of the "temporary type" with widely fluctuating outbreaks of short duration. The demise of the temporary type in the late 1930's was associated with the appearance of resistance in the sawfly to the parasite via egg encapsulation (Muldrew 1953). The resistant strain of the sawfly is now dominant in most of the United States and Canada (Drooz 1973).

Since experience with *Mesoleius* indicated that the permanent type can be replaced by the less destructive temporary type of outbreak pattern, Canadian entomologists sought additional European parasites for release. They succeeded with the introductions of two European ichneumonids, *Olesicampe benefactor* Hinz and an encapsulation resistant strain of *Mesoleius tenthredinis* from Bavaria (Turnock and Muldrew 1971). Since the original and Bavarian strain are indistinguishable in morphology, their successful introduction was authenticated by the relative frequency of effective parasitization by *M. tenthredinis*. Parasitization increased from less than 10% to 30% and 60% in two different release plots.

Olesicampe benefactor was also a successful parasite, attacking over 90% of the sawflies in several release locations. In addition, it has a remarkably good dispersal ability and presently can be found within ca. a 200 mile diameter area centered at a point 100 miles north of Minnesota on the Manitoba-Ontario border (Muldrew, personal communication). Although it has a highly effective hyperparasite, *Mesochorus dimidiatus* Hlgr., *O. benefactor* promises to be an important parasite of the larch sawfly (Turnock and Muldrew 1971).

Because of the success of the Manitoba introductions and the successful introduction of *Olesicampe benefactor* into Nova Scotia, New Brunswick, and Maine (Embree and Underwood 1972), the Minnesota Department of Natural Resources and the University of Minnesota started a program to introduce both *O. benefactor* and the Bavarian strain of *M. tenthredinis* into Minnesota. In addition to the protection of our tamarack resource, the goals of the program are to determine the dispersal of these parasites, their interaction with the existing parasite fauna, and to determine the subsequent response in tamarack growth resulting from anticipated reductions in defoliation. These factors are

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important for future management of sawfly populations and to help develop guidelines for biological control of other sawflies.

METHODS

About 75,000 late instar larch sawfly larvae were collected from areas in Manitoba known to be heavily parasitized by either *Olesicampe benefactor* or *Mesoleius tenthredinis*. Larvae were reared in cages with tamarack foliage until cocoons were formed. After storage in sphagnum moss at 1°C, the cocoons were placed in groups of 20 in petri dishes and kept at 15°C until adult parasites emerged. The parasites of each species were placed in a 1 sq. foot mating cage for 2-4 days and then released in sawfly infested stands in north central Minnesota in 1971 and 1972 (Koochiching, Beltrami, Itasca and Lake of the Woods counties). We used 16 stands of 4 or more acres each, spaced 5 or more miles apart. Four plots received approximately 100 mated *O. benefactor* females; 4 plots received approximately 350 mated *O. benefactor* females; 4 plots approximately 110 mated *M. tenthredinis* females and 4 plots were used as controls.

RESULTS AND DISCUSSION

Preliminary results from the study plots have shown that:

(1) *Olesicampe benefactor* has been established in Minnesota from our releases. In 1972, 3 specimens were reared from 2 of the 4 plots where 100 parasites were released and 25 specimens in 3 of the 4 plots that received 350 parasites. On the basis of the size of overwintering cocoons, we anticipate that all four of the 350-parasite release plots will show increases in 1973.

(2) The Bavarian strain of *Mesoleius tenthredinis* has been established in Minnesota from our releases. Prior to 1972 all plots had less than 10% parasitization by *Mesoleius*. In 1972, 2 of the 4 release plots showed increases in parasitization from 10 to about 30%. All other 14 plots remained at less than 10%.

(3) There has been natural spread of *Olesicampe benefactor* into Minnesota from the 1961 releases near Pine Falls Manitoba ca. 200 miles northwest of our Minnesota plots. Three adults were reared in 1971 from cocoons collected in a Beltrami County plot. These parasites came from hosts attacked in 1970 and therefore could not be attributed to our 1971 releases. Single specimens were reared from collections in plots in Koochiching and Lake of the Woods Counties in 1972. These plots were 10 miles or more from our 1971 release plots. These are the first records of natural spread of the parasite into the United States.

Both because of the natural spread of *O. benefactor* into Minnesota and because of the successful establishment of both parasites in Manitoba in similar habitats, we feel that these parasites are likely to be permanently established in Minnesota. Without the Canadian history of establishment, we would be concerned that our recovery of the parasites might only represent temporary establishment as defined by DeBach and Bartlett (1965).

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BOOK REVIEW

"AN INDEX TO THE DESCRIBED LIFE HISTORIES, EARLY STAGES AND HOSTS OF THE MACROLEPIDOPTERA OF THE CONTINENTAL UNITED STATES AND CANADA," by Harrison Morton Tietz, 1972. Two volumes, 1041 p., published by A. C. Allyn for the Allyn Museum of Entomology, Sarasota, Florida. Distributed exclusively in North America by Entomological Reprint Specialists, P.O. Box 77971, Dockweiler Station, Los Angeles, California 90007. Price: \$25.00 U.S. per set.

This monumental Index is the first attempt to prepare a bibliography of the immature stages of North American butterflies and moths since Edward's *Bibliographical Catalogue of the Described Transformations of North American Lepidoptera*, published in 1889. The compilation includes Edward's work and published data through sometime in 1950 when the manuscript was initiated. Except for an introduction by William D. Field and J. F. Gates Clarke, both of the National Museum of Natural History, there is no introduction or other prefacing remarks by the author.

The Index is divided into two parts: Part I—Insects, and Part II—Plants, although Volume 1 contents, representing about half the total number of pages, continues into Volume 2. Under Part I, there are three sections: A—Works Consulted (periodicals, separate works, bibliographies); B—Insect Common Names and C—Macrolepidoptera. Included in the latter section are the names of all species, subspecies and forms, including synonyms, alphabetically listed with cross-references to the main entry. The nomenclature follows that of McDunnough's 1938 *Check List of the Lepidoptera of Canada and the United States of America: Part I, Macrolepidoptera*. Each main entry is followed with synonyms, forms and subspecies, bibliography of published life history references and list of food plants. This section represents the greatest number of pages in the Index, and is one of the most valuable to the researcher.

Part II includes five sections: A—Zoological Hosts; B—Common Names; C—Indefinite Designations; D—Scientific Names; E—Synonyms. It would appear that Section D is most useful as it lists host plants and their "Insect Enemies." The plants are listed alphabetically by genus and species with the common name, followed with a list of all known macrolepidoptera arranged by family. When the scientific name of the plant is unknown, it can be located in Section B under the common name.

Undoubtedly, this Index will be a valuable reference to professional and serious amateur lepidopterists, especially those engaged in life history studies or rearing activities. It will enable anyone to quickly determine whether or not life history or food plant