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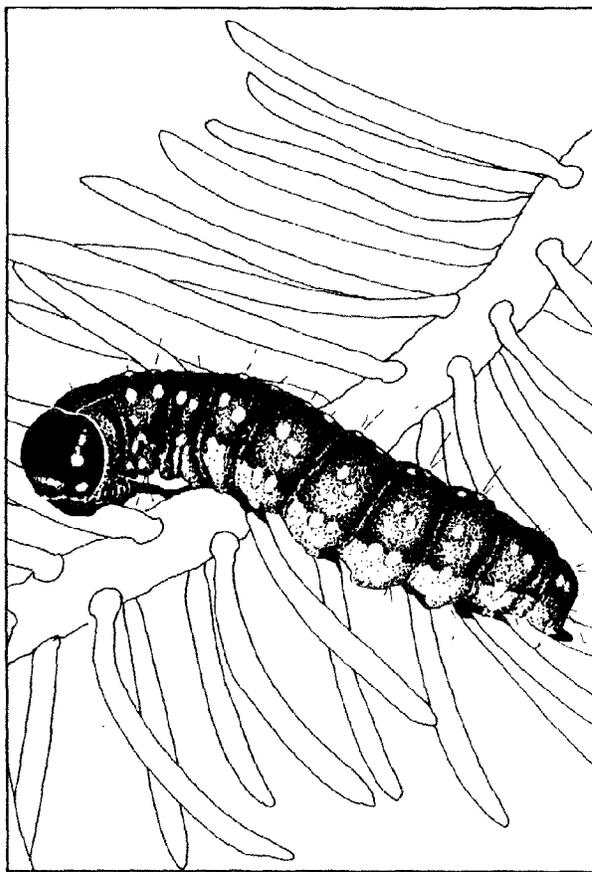
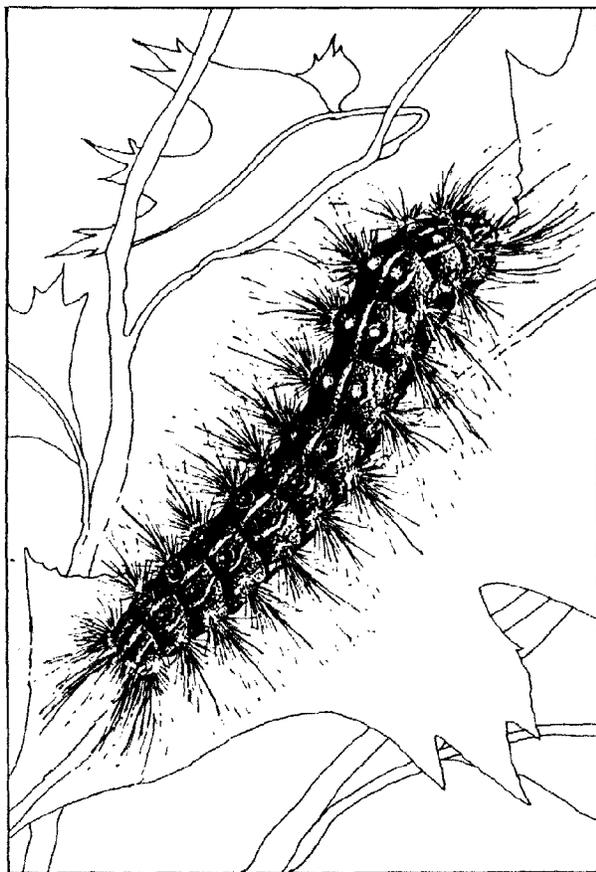
1983



  
canusa

# Proceedings

## Forest Defoliator - Host Interactions: A Comparison between Gypsy Moth and Spruce Budworms



## FOREWORD

The Canada/U.S. Spruce Budworms Program in cooperation with the Center for Biological Control of Northeastern Forest Insects and Diseases of the Northeastern Forest Experiment Station co-sponsored this Forest Defoliator-Host Interaction Workshop. This invitational workshop was limited to investigators of the spruce budworms and gypsy moth in the Forest Service, Canadian Forestry Service, and the University sector. The primary purpose of this workshop was to foster communication between researchers having a mutual interest and active research projects designed to understand the relationships between the host plant and forest defoliator feeding behavior, growth, and reproduction.

This Workshop was a follow-up to two previous meetings on host-insect interaction. In 1980, Dr. W. Mattson hosted a CANUSA-sponsored meeting at the North Central Forest Experiment Station, St. Paul, MN. This informal gathering brought together CANUSA Program investigators from the US and Canada for the purpose of sharing preliminary information and data on host-insect interactions. The second meeting took place in the fall of 1982. CANUSA(E) sponsored a Symposium on Spruce Budworm-Host Interaction at the Eastern Branch Meeting of the Entomological Society of America, Hartford, CT. The current Workshop developed from this Symposium. We found that participants were raising question concerning the similarity or differences between the spruce budworm and gypsy moth host interaction systems.

These Proceedings resulted from a three-day Workshop held in April 1983 at the Park Plaza Hotel, New Haven, CT. The structure of the Workshop allowed each participant a period for a presentation followed by lengthy discussion. These discussions were lively, friendly technical exchanges clarifying or elaborating on points raised by the speaker. Frequently, these exchanges were thought-provoking and often provided avenues for further detailed discussions and in some cases, future cooperative efforts.

The papers that make up these Proceedings were submitted at the Workshop as camera-ready copy. As a result, the participants did not have the benefit of reappraising their work in light of the discussions that followed their presentations or other ideas that developed at the Workshop.

Since the Workshop was planned late in the life of the CANUSA Program, we asked each investigator to be especially aware of the implications of these interactions on population dynamics of the insect in relation to forest management potential. When possible, we also asked that future research needs and direction be mentioned.

As technical coordinators for this Proceedings, it was our task to arrange and more effectively focus material so that papers provide a smooth transition of ideas and research

activities on insect-host interactions for the spruce budworms and gypsy moth.

Lastly, we would like to acknowledge the support and confidence expressed by the following:

Denver P. Burns, Director, Northeastern Forest Experiment Station

Melvin E. McKnight, Program Leader, CANUSA

William E. Wallner, Director's Representative, Hamden, CT

August 1983      Robert L. Talerico, Broomall, PA

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## COVER SKETCH

Left, gypsy moth larva; right, spruce budworm larva.

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THE QUEST FOR ANTIFEEDANTS FOR THE SPRUCE BUDWORM

(CHORISTONEURA FUMIFERANA (CLEM.))

M.D. Bentley

Professor of Chemistry, University of Maine,  
Orono, ME. 04473

D.E. Leonard

Professor of Entomology, University of  
Massachusetts, Amherst, MA. 01002

G.M. Strunz<sup>1</sup>

Research Scientist, Maritimes Forest Research  
Centre, Canadian Forestry Service, Fredericton,  
N.B., Canada. E3B 5P7

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Extracts of non-host plants and selected naturally occurring compounds have been screened for their effects on feeding by spruce budworm larvae, (Choristoneura fumiferana (Clem.)), using as diet a filter paper substrate impregnated with the synergistic feeding stimulants, sucrose, and L-proline. The most potent feeding deterrents identified to date are alkaloids.

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A simple, fast and reproducible feeding assay for spruce budworm larvae, (Choristoneura fumiferana (Clem.)), was described by Bentley, Leonard, and Mott (1979).

For the assay, sixth-instar larvae are induced to feed on a filter paper substrate impregnated with the synergistic feeding stimulants sucrose and L-proline. Frass resulting from ingestion of this material is readily recognizable, and counts of frass pellets provide an indication of the quantity consumed. The effects on feeding of adding plant extracts and test chemicals to the substrate can thus be investigated readily. Its simplicity, speed, and modest requirements for test material make this assay suitable for mass screening, and it has, to

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<sup>1</sup>Paper presented by this author.

date, been used to test more than 110 non-host plants, as well as about 60 naturally occurring chemicals, for their effects on budworm feeding.

An analysis of the results, published recently (Bentley et al. 1982), reveals that although none of the plants tested is a normal host of spruce budworm larvae, only six extracts displayed activity in the category designated "highly deterrent". All plants belonging to the most active group are known to contain alkaloids, and, in each case, the greatest activity was found to be localized in the basic fractions. Among the pure alkaloids tested, including representatives of the pyrrolizidine, solanum, quinolizidine, berberine, and strychnos groups, fewer than 25% were "highly deterrent" at the concentrations assayed.

Recent research has been directed to a "fine-tuning" of the bioassay, to provide greater sensitivity and allow more protracted observation of the effects on larvae of the test compounds. In addition, further screening is planned in an attempt to identify potent feeding deterrents with minimal toxic properties. A study of the structure-activity relationships which have begun to emerge may prove to be a profitable direction for future research.

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