Project Update: Invasions and Reductions in the Canadian Insect Fauna

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A workshop on invasions and reductions in the Canadian insect fauna was held at the Annual Meeting of the Entomological Society of Canada, Sault Ste. Marie, September 26, 1993.

Programme

Dixon, Peggy and David Larson. Agriculture Canada Research Station, St. John's & Dept. of Biology, Memorial University, St. John's, Newfoundland A2B 3X9.

Europization of the Canadian fauna: diversification or homogenization?

Haack, Robert. U.S. Dept. of Agriculture, North Central Forest Experiment Station, 1407 S. Harrison Rd., East Lansing, MI 48823-5200.

Establishment, spread and potential impact of the common pine shoot beetle, Tomicus piniperda, in North America.

Galloway, Terry. Dept. of Entomology, University of Manitoba, Winnipeg, Manitoba R3T 2N2.

Patterns in introductions and range extensions for fleas in Canada.

Marshall, Steve. Dept. of Environmental Biology, University of Guelph, Guelph, Ontario N1G 2W1.

Nonsystematic systematics - the role of regional collections in tracking invasions and extirpations.

Packer, Laurnece. Dept. Of Biology, York University, 4700 Keele St., North York, Ontario M3J 1P3

The extirpation of Karner Blue and Frosted Elfin butterflies in Canada: implications for the use of indicator species in Canada.

Roughley, Rob. Dept. of Entomology, University of Manitoba, Winnipeg, Manitoba R3T 2N2.

Historical changes in the ranges of some insects.

Shorthouse, Joe. Dept. of Biology, Laurentian University, Sudbury, Ontario P3E 2C6.

Introduction and dispersal of cynipid wasps and their parasitoids on domestic roses.

Spence, John. Dept. of Entomology, University of Alberta, Edmonton, Alberta T6G 2E3.

Local expansion and impact of an exotic groundbeetle: some puzzles about habitat effects.

Turnock, Bill. Agriculture Canada Research Station, 195 Dafoe Road, Winnipeg, Manitoba R3T 2M9.

Invasion of Western Canada by Coccinella septempunctata

Mason, Tom. Metro Toronto Zoo, Scarborough, Ontario M1E 4R5.

United States program on the American carrion beetle,. Nicrophorus americanus

Freitag, Richard. Department of Biology, Lakehead University, Thunder Bay, Ontario P7B 5E1.

Changing locality patterns of Canadian tiger beetles.

Synopsis of Workshop

The majority of these 11 presentations discussed the introduction and subsequent spread of exotic species in North America. Two papers dealt with the loss of Canadian populations of species associated with changes in habitat, and several treated, directly or in-

directly, changes in the ranges or community compositon of native species.

Two approaches to studying change in insect faunas were exemplified. Most presentations dealt with change over time and depended upon a historical data base to detect changes in species distribution and abundance. Related to this approach was the approach of comparing contemporaneous communities in order to ascertain patterns of species dispersal, range change and interactions. J. Spence, on the other hand, used a population-experimental approach to investigate population processes and interspecific interactions on smaller spatial and temporal scales.

The population-experimental approach has the advantages of potentially demonstrating causality for range changes and contributing to general models on the dynamics of variation in distribution and abundance. In this way it encompasses general population ecology approaches. While this is certainly the research direction required for understanding the processes involved in range changes, it is demanding in terms of resources, difficult to involve a community of participants of varied interests and commitment, and is applicable only to relatively few species at a given time and generally in a restricted region.

Monitoring changes over time and space requires an adequate data base for temporal and spatial comparisons. T. Galloway showed how a good published data base can be used to detect interesting patterns and changes within a fauna. Other presentations depended upon specimens (or their lack) in collections to provide the data base from which conclusions regarding species status could be derived.

L. Packer and T. Mason showed how change in specialized habitat can extirpate populations of ecologically specialized species. Habitat preservation or restoration is a key to maintaining certain species within the fauna.

Discussion following the presentations identified some problems associated with studying faunal change and produced some recommendations or possible approaches to studying the process. Some of these ideas are:

1. Encourage population-level ecological studies on species with distributions that are showing marked changes (both contracting and expanding).

Such studies are specialized, requiring tight control by one or a few principal researchers. Because of this, they are more suited to development by individuals than by a larger community of participants. The product would be published papers which would form a permanent data base.

2. Encourage publication of information on the distribution and status of species.

Publication of reliable species records provides a permanent record of known distribution. This is best done for exceptional species or members of higher taxa in the formats of revisionary studies, faunal manuals such as handbooks, or papers outlining distributions. Reliable and comprehensive accounts of species from specific habitats or smaller geographical areas also give a good data base. These should be accompanied by voucher specimens in public museums.

3. Develop data bases which will provide historical and spatial records of the distribution of Canadian insects.

One of the best data bases is actual specimens. If accessible and properly preserved, these represent an unambiguous record of the presence of a species in a particular area. Such a data base need not depend upon suitability for publication but it should lead to publication so that the data become more widely available and more permanent than physical specimens. However, lack of good taxonomic understanding of many groups is an impediment to the production of published data bases.

A data base of specimens depends upon 3 components:

collection of specimens;

sorting and curation;

storage.

Collection of specimens is the easiest of the three components. Collecting, especially when trapping techniques are used, can far outstrip the resources for curation and storage. It was suggested that material be amassed regardless of the ability to handle it further and that it be bulk stored; at least in this way collecting opportunities would not be missed. Most museum curators shudder at such a thought for most have had experience with huge survey collections that could never be processed and took up space but yet caused guilt feelings when eventually they had to be disposed off.

Sorting and curation are time consuming and therefore very expensive. Also, the quality of this work depends upon the training of people and simply assembling skilled personnel can be difficult.

Storage is an important consideration because no collections have unlimited space that can be used for indefinite storage of specimens that may have future value. Some form of selection needs to be done and this is usually rather subjective depending upon the interests of the museum. A possible approach might be for museums to add a specimen of each (or select) species from each region of interest to the museum at some regular interval.

4. Arrange for multiparticipant surveys.

Examples of several types of surveys for monitoring population changes in some groups of organisms were given, namely: amphibian surveys; Cambridge ladybird survey; Xerxes Society butterfly surveys; bird nest record survey. Possibly similar surveys could be established for various insect groups but each would depend upon a coordinator, participants who could recognize the relevant taxa, and a standardized survey methodology. Although a suitable population of participants does not seem to exist on a country-wide basis at present (although regionally there are some strong groups), good taxonomic knowledge of some taxa (e.g. carabid beetles) and shift of naturalist's interest from birds to the larger insects (dragonflies, butterflies) may make this sort of survey possible with suitable leadership. R. Freitag was able to get useful information with a simple questionnaire.

5. Identify key habitats.

Because of the importance of habitat to species persistence, identification of localized habitat types, especially those of high diversity and / or endemism, would provide a basis for conservation strategies. It may be possible to monitor the health of such sites by surveying a few indicator species that are tightly associated with particular habitats.

Future Directions

Possible future directions to the project, or roles the Biological Survey could take, include:

1. Organize another workshop / symposium with a narrower focus and a longer lead time and publish the proceedings. A possible topic would be insect extirpations.

2. Encourage groups to develop regular surveys with standardized information gathering, storage and reporting systems.

3. Continue to support collections (especially regional collections) in recognition of their role as basic repositories of data on faunal change.

4. Encourage publication of faunal treatises, lists or information on changes in species ranges or abundance.