



This work is licensed under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 United States License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/us/> or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA.

## SUMMARY

### Morning Session

Rapporteur – D. R. Whitehead  
*Department of Entomology*  
*University of Alberta, Edmonton, Alberta*

Bruce Heming introduced today's discussion by pinpointing what he considers to be the crisis in entomological education. Too many students are graduating to fill too few jobs. In the eyes of the public our product is overqualified and is therefore, paradoxically, useless. To the modern taxpayer it seems that science creates rather than solves problems and taxpayer support is therefore lacking. We must therefore re-evaluate what is required of entomological education and we must also re-educate the public as to our actual goals. The goals of this meeting are, as was noted again later by Dr. Gittins, to answer these three questions. First, what is the proper education for entomologists of all kinds? Second, what can entomology contribute to education in general? Third, what has been done at the University of Alberta and what should be done?

Our first speaker this morning, Don Jantzie, gave us his thoughts as a teacher of high school biology. He lamented that entomology, general and environmental, is not treated in sufficient depth in high schools. Students should not only be stimulated but should have sufficient background to make value judgements when they become taxpayers. They should further, at secondary school level if not perhaps much earlier, be instructed in effect in what I would call insect appreciation or relevant entomology.

Problems in entomological education at secondary levels are lack of adequately trained teachers and lack of suitable texts. The second of these, promised by Dr. Gittins, is about to be resolved. The first, however, seems to be up to us. We need lateral education at university level with participation of faculty of education students in entomology programs. And, entomologists must become more involved with secondary education at teaching and curriculum planning levels.

Rick Freitag gave us his views from a base at a small, mainly undergraduate, Canadian university. He modified the statement of crisis in entomological education given earlier by Dr. Heming to one that university enrolments are decreasing and job placement becoming more difficult. Science enrolments, however, continue to increase, complicating the problem of job placement. Students in science programs seem job oriented – only about 10 to 15% seem interested in education *per se*. Some students drop out because of bleak employment prospects, some prospective students do not even enrol for the same reason, and some opt to take further training at more vocational-oriented institutions. According to Rick we should prepare the entomology or biology student with a broad range of options by (1) continuing surveys designed to acquaint academia with public requirements, (2) offering enhanced opportunities for undergraduates to experience multi-disciplinary research, and (3) insuring at both undergraduate and graduate levels, opportunities for lateral education. This is essentially the reverse of what Mr. Jantzie suggested but completely complementary. Jobs of the future may not now be foreseen and yet provision should be made for their fulfillment.

Art Gittins gave his views from a base that is somewhat larger – a U. S. Land Grant University which I take to be strong in both undergraduate and graduate programs. He noted that while Ph.D. production rates in the U. S. nearly tripled from 1959 to 1969, these Ph.D.'s, though still urgently needed in such areas as environmental quality control

and pest management, are no longer in demand. Entomologists in education must modernize and redirect the total curriculum and must also provide both public and government with a clear awareness of the need for entomologists. At university, broadened education is again called for. At undergraduate levels, training should be closely allied with biological science with specialization left to the graduate level. Exceptions may be when undergraduate training is terminal perhaps as in pest management entomology. Courses should be updated to accommodate today's more sophisticated high school graduate. Above all, students should be made aware that education must continue after graduation through their professional lives.

Graduate level education should be re-examined. Faculties should be carefully structured to meet modern needs. Students should be exposed to new technologies as they become available. Dr. Gittins asked a number of interesting questions. Should we have research-oriented Master's level degree programs? Should we not, in fact, have non-research-oriented Ph.D. programs? Should not superficial foreign language requirements be eliminated or replaced by requirements in computer languages? The student should have an opportunity to be broadened in experienced, not channelled.

Now, to get at the three main questions addressed to this symposium, I shall attempt to put together remarks made by our three morning speakers, by the discussion leader Dr. Pengelly and by members of the audience.

First, "What is the proper education for entomologists of all kinds?" As suggested by Dr. Pengelly, entomology should be clearly defined for the public, including the government. This is up to us as entomologists. Students should be introduced to the subject at an early age, perhaps even before they become students. We must, and it seems we are about to, produce suitable books that can be read in high school level or by the general public. Should the orientation of training be vocational or educational? Again, there seems to be some disagreement. It was suggested first, by Dr. Pengelly I believe, that the current job situation is normal, not depressed. Thus, perhaps continued emphasis on educational aspects may be desirable. Dr. Pepper, however, implied that professional entomological training never has been relevant.

Some members of this symposium have suggested broadened lateral education both for entomologists and for non-entomologists. I gathered that there is not total agreement with this idea though it seems a good one to me. In my opinion, which perhaps is not out of place here, Rick Freitag's suggestion – increased lateral and multidisciplinary education in entomology – does seem appropriate.

I think Mr. Gurba may have alluded to the central problem, in providing more emphasis in communication in entomological training, so that our graduates need not be solely research entomologists.

The second question was, "What can entomology contribute to education in general?" This question, really, is not easily distinguished from the first and perhaps should not be. Entomology should indeed be a part of education in general. The emphasis again is on communication and we as entomologists are responsible for educating the public and the government.

The final question was, "What has been done at the University of Alberta and what should be done?" If my memory serves me correctly, there was general agreement that in Professor Strickland's day entomology at the university was ideal. It was suggested by some participants this morning that entomology at the University of Alberta should return to the form it then took; indeed, perhaps if enrolments continue to decline, entomology here may do just that – but as a discipline it would very probably soon disappear. Again, this question is not really separable from the first and may be similarly answered. It would seem desirable

that future students have broadened, non-entomological training, especially to include exposure to and communication with non-entomologists including professionals in other fields and with the public. Please bear in mind that this is this morning's discussion, however.

I hope that I have done reasonable justice to thoughts given by those involved in the preparation of the product and will now turn this over to Martin Chance whose responsibility will be to summarize views of the users of the product.

### Afternoon Session

Rapporteur – M. A. C. Chance

*Department of Entomology*

*University of Alberta, Edmonton, Alberta*

Bill Mason began with what he hoped was a pessimistic view of the future of the great systematic biology collections in Canada and the U. S. With static financial support, systematists will be expected to cope with an ever-increasing inflow of new specimens and an ever-increasing number of requests for identification. Eventually, conditions will become such that identification will become slow or impossible. Large portions of valuable collections may be destroyed because they were neglected and large amounts of data will become unretrievable. Dr. Mason points out that to avoid this dismal future those of us interested in the maintenance of museums must agitate for increased museum support. The second problem, he tells us, is the conservative nature of the taxonomists themselves. They retain old, time-consuming nomenclatural and information retrieval methods which could be replaced by a fast, computerized validating service. As well, with the help of computers, much of the routine identification could be carried out by technicians. Will the computer replace the scientist? Dr. Mason thinks not. The computer cannot extract new data from unworked specimens nor can it replace the research brain. Is the taxonomist likely to run out of material? The Insecta are not only the most numerous of all living creatures but are also the least known. Largely due to expansion of Canadian facilities in the 1960's, the production of Canadian Ph.D.'s now far exceeds the demand for them. Continued overproduction is a disastrous policy. Dr. Mason suggested what he feels are two reasonable courses of action. First, lowering production and second, convincing employing agencies that more entomologists are needed. The first has been unsuccessful hitherto as can be seen by the present employment situation. The second involves salesmanship – the conversion of something thought to be a luxury into a necessity in the minds of those with enough money to pay for it. The popularity enjoyed by environmentalists and conservationists should be the key to this sales approach. Dr. Mason thinks the university should be in advertising but also that all entomologists should be involved. Our public image as a group must be improved.

Neil Holmes began by indicating that the CDA has, in the past, been the largest employer of entomologists in Canada and that, within the next eight to 13 years, it will require 60 to 80 new entomologists. This demand will be modified by the capacity of entomologists to explain the importance of their research, by additional dramatic outbreaks of pest species such as that of the Bertha armyworm last summer, and by public reaction to the use of insecticides. Dr. Holmes indicated that most entomologists in agricultural research are in applied fields. Those involved with relatively pure research are decreasing in numbers. There is a general trend towards programs with an interdisciplinary approach. Whatever the research, the agricultural entomologist becomes involved in a wide range of activities directed to the management of insect populations. How should an agricultural entomologist be