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A VIEW OF BIOLOGY AND ENTOMOLOGY FROM THUNDER BAY

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*"The elder statesmen sit on the mats,
 And wrangle through half the day;
 A hundred plans they have drafted
 and dropped,
 And mine was the only way."*

— from the Book of Songs,
 675 B. C. by Confucius

As you probably know, during the last five years almost every university sector has had its share of crises. Most of these have been corrected to some extent, while others persist. Some are growing worse. Two matters of concern to the Ontario university community are a marked decline in student enrolment, and a scarcity of jobs for students following graduation. As a means of offering information toward reaching the objectives of this session, I shall attempt to describe the two conditions, in particular as they affect biology and entomology in Ontario. Then I shall offer some possible remedial concepts for discussion.

It is well known now that most universities in Ontario experienced a shortfall in projected enrolments in September, 1971. At first it was looked upon as a brief dip in a clinal increase in the numbers of students entering universities. The usual observations, analyses and rhetoric followed in the academic and mass media. Concurrently, budgetary adjustments were made and by December, 1971, the crisis had almost been overcome. However, this year the crisis has reappeared with even more vigour (Table 1).

According to a recent report of the Committee on Statistics and Enrolment Projections, of the Ontario Universities' Council on Admissions (February, 1972), evidence from submissions of individual universities indicates that applications from students in Grade 13 are down by 5% compared to those at the same time a year ago. Also, the number of non-grade 13 applicants into first year is less than half of what it was a year ago. Thus, the total number of applications to Ontario universities is down by 7 to 8% from what it was a year ago. There are also major shifts in program preferences of applicants as indicated in Table 2.

Applicants for combined Arts and Science have declined by 16%, for Arts by 14% and for Engineering by 10%, while applicants for Science have increased by 9% and for other programs by 4%. Part of the expected 9% increase in the sciences is due to slightly increased enrolments in the Life Sciences programs, which is probably because of ecological charisma. Increased enrolments in the life sciences are taking place in other Canadian universities as indicated by a survey conducted by Dr. Von Borstel, Chairman of the Department of Genetics at the University of Alberta.

The Minister of Colleges and Universities of Ontario, Mr. George Kerr, recently announced to the legislature that Ontario universities are expecting a 5% drop in enrolment next fall, so there is no reason to believe that the situation will improve by September. The decline in enrolment last year and possibly next year may indicate a trend. If so, it precedes by approximately 20 years a projected decline in enrolment in universities in Ontario provided by the Draft Report of the Commission on Post-secondary Education in Ontario (Queen's Printer, Toronto, 1971). The commission notes this 1972 discrepancy but does not elabo-

rate on its occurrence.

In addition to the problem of enrolment, students are experiencing increasing difficulty in finding employment. Some statistics from student placement offices and unemployment centres show this to be a general trend. Because employment for biology and entomology students is in part what concerns us, I have selected the following table from a report of the committee investigating employment problems of entomologists in Ontario, by Drs. R. L. Edwards and P. S. Corbet (1970), as a more specific example (Table 3).

Table 1*. Total applicants to full-time programs in the Ontario Universities.

UNIVERSITY	1971	1972	DIFFERENCE	TOTAL DIFFERENCE
Brock	2,512	1,883	- 629	- 8,862
Carleton	5,962	5,265	- 697	
Guelph	6,670	6,475	- 195	
Lakehead	1,590	1,684	+ 94	
Laurentian	2,190	2,100	- 90	
McMaster	10,299	10,758	+ 459	
Ottawa	4,941	4,942	+ 1	
Queen's	9,258	8,653	- 605	
Toronto	18,034	17,410	- 624	
Trent	3,525	2,535	- 990	
Waterloo	14,517	12,533	- 1,984	
Western	17,648	15,600	- 2,048	
Windsor	4,796	4,124	- 672	
York	11,164	10,441	- 723	
W. L. U.	2,631	2,472	- 159	

Table 2*. Applicants to first year full-time programs in the Ontario Universities on or about February 15, 1972.

PROGRAM	1971 TOTAL	1972 TOTAL
Arts & Science	13,970	11,688
Arts	28,756	24,708
Science	10,560	11,507
Engineering	5,412	4,856
Other	12,155	12,652

*Tables 1 and 2 adapted from Report of the Committee on Statistics and Enrolment Projections of the Ontario Universities Council on Admissions. Meeting of committee held February 24, 1972.

Table 3*. Numbers of graduate students in entomology at Ontario Universities in 1970-71, and the number of existing positions for entomologists in Ontario from 1969 to 1971.

Number of graduate students in entomology in Ontario Universities:

M.Sc.	33
Ph.D.	<u>21</u>
Total	54

Number of existing positions for entomologists in Ontario:

	1969	1970	1971
Federal Government Service	120	115	115
Ontario Government Service	8	8	4
Industry	2	2	2
Ontario Universities	<u>38</u>	<u>40</u>	<u>40</u>
Total	168	165	161

*Report of the committee investigating employment problems of entomologists in Ontario. Proc. ent. Soc. Ont. 101:89-92, 1971.

The authors conclude that "if the rate of turnover is 3% per annum, we can expect vacancies for entomologists to become available at the rate of approximately five per year. However, the total number of existing positions for entomologists is expected to decline at about the same rate, from 168 in 1969 to a projected 161 in 1971." So opportunities for employment in universities, government and industry do not look too promising for the next few years. The situation is probably not any better for graduate students in other fields of biology. The drop in student numbers and the decline in employment opportunities are probably real and obvious while the underlying reasons seem more elusive. The classes at Lakehead University tend to be small, (no, an optimal size), and teacher and student usually communicate at the individual level. According to some of my students, many high school graduates no longer come to university because they feel taking an undergraduate degree is a wasted effort if it does not help them in getting a good job. Others tell me that many students *drop out* of university for the same reason. One of our top graduating students expressed the view that the increasing drop out rate in universities is mainly due to uninteresting courses and programs, not because students are unable to do the work. He suggested that the three-lecture, one-lab-per-week course becomes a 'drag' by the middle of the second year, and that project courses dealing with up-to-date problems should replace some of the others. He was very enthusiastic about a full-year chemistry course in which the entire second half was devoted to a laboratory project on the DNA molecule.

Some students believe that job-oriented community colleges have attracted high school graduates who would otherwise have gone to university. In order to understand more quantitatively the priorities of gaining qualification for work as opposed to an education, in the minds of biology students, I conducted a brief survey in two of my classes. Of course both processes are hardly separable in a biology degree program but I asked them to give

priority to one or the other. Thirty-nine students stated that they attended university primarily to obtain qualifications for employment and 14 claimed that they were taking the program because they enjoyed biology.

The relationship between job opportunities and education is much more difficult to define than causes of decline in student enrolment. This is clearly expressed in the Draft Report (1971, p. 28) as follows: "An important aspect of post-secondary education is its relationship to the labour market. Paradoxically enough this relationship is in most cases fuzzy. . . . We apparently do not have sufficient data even to describe or evaluate such a relationship. Under such conditions it would be difficult and irresponsible to forecast future linkages of education and manpower needs. It is often said that the majority of jobs our current generation of students will hold in their lifetime have not yet been invented."

Although student enrolments are increasing in biology and entomology programs, there is no evidence that job opportunities are improving for biology graduates. Indeed, increasing numbers of our graduates find employment in fields not related to biology. I was surprised to find two of our biology graduates working as permanent employees in an Ontario liquor store. Hardly a place for biologists, but they seemed to enjoy their work.

What then can we do to improve the situation for our students while remaining committed to our subjects and maintaining the good programs we now have? I suggest that we attempt to increase the development of biology and entomology in a lateral dimension. Surely in our changing society, new and different occupations are developing in which an education in biology or entomology is essential, but not to the extent provided by the programs we now offer. The following recommendations are a list of personal views which have developed from my experiences at Lakehead University. These recommendations are not intended to replace or change any traditional activities or programs. They are proposed rather as possible supplementary avenues of development. I shall give the recommendations and a brief rationale for each.

Recommendations

1. That university biology and entomology departments conduct annual surveys with a view to determining the present scope of entomology and biology.

A few weeks ago Dr. S. Madras, Director of the Liberal Science program at York University, visited Lakehead University to discuss Liberal Science with us. Dr. Madras served on several education advisory committees in Quebec of which part of their terms of reference was to determine the role of educational institutions for the government. He remarked that the conceptual profile of a university changes when the university is observed from varying distances and positions. His experience was that the interactions of universities and society became clear when he communicated with people who were considerably removed from the university milieu. Now this kind of experience is not new to field biologists who in fact use the process as a means of studying a single species in its natural environment, i.e. autecology. In my opinion, a carefully designed and executed autecology of biology and entomology would provide a greater understanding of our relationships to a changing society. It would also reveal possible interactions of our disciplines with academic and other sectors of society which could benefit biology, entomology and our students. Perhaps the survey could be conducted on a larger scale, that is by all life sciences departments in a university or even on a provincial or national scale. The survey could be conducted at two levels. First, an assessment could be made on the relationships of the classical programs, courses and course content to the professional occupations of biologists and entomologists. Second, and probably more important at this time, information could be obtained on occupations which require or should require graduates with some

knowledge of biology and entomology. We could also determine adaptations necessary to ensure that our subjects successfully evolve. Among the many probable advantages deriving from such a study would be ideas for establishing new course programs. Information would accrue that would be valuable in counselling first year students in determining a course program for a specific goal. The data obtained would be of benefit to all biologists across the country.

2. That major (biology, entomology) – minor (business administration, economics, law, political science, chemistry, physics, etc.) programs of study be developed for uncommitted students.

By uncommitted students I mean those who are taking a degree in biology or entomology but who also have special interests in other fields of study. There can be a definite advantage to having a strong training in two subjects with respect to getting a job. One of our students has a diploma in forestry and a B.Sc. degree in biology. He was hired to teach vocational subjects and academic courses in a vocational high school in Swan Lake, Manitoba. He was told that he would not have been offered the job if he had had only a degree in biology or in forestry. Another one of our biology education graduates was just hired to teach science in a high school in North Bay, Ontario. He completed a chemistry program in a community college before coming to Lakehead University. The principal of the high school informed him that he was hired primarily because he had a good background in both biology and chemistry. These are two examples of a possible growing demand for university graduates with such qualifications. Major-minor programs would clearly serve this need not only in education but in other occupations as well.

3. That honours students' research topics be multidisciplinary. A greater effort should be made to hire undergraduates for research being conducted by biology or entomology faculty, especially for multidisciplinary research.

Multidisciplinary research provides a good groundwork for more specialized research. I feel that the third undergraduate year or the honours year is a good level for such research. The student, while completing a program composed of subjects often apparently related, can obtain an appreciation of how they actually do relate. In addition, undergraduate students would greatly benefit from supervised research, particularly if they plan to continue graduate studies in a specific biology. Also, if a student plans to leave university this experience provides potential employers with a more complete picture of the student's abilities.

4. That a major (biology, entomology) – minor (business administration, economics, law, chemistry, physics, etc.) M.Sc., Ph.D., program be developed.

This kind of graduate project would require increased cooperation among university departments which is one of the main reasons for the recommendation. In my view the greatest failing in our society is the colossal human sound barrier among its components. This problem is well illustrated by the present environmental issue on which our political leaders and biologists seem to maintain an impasse. What better way to bridge this gap than with a graduate 'biobarrister' or 'entopolitician.'