Book Reviews

The Geosciences in Canada 1974: A status report prepared by the Canadian Geoscience Council.

Edited by E. R. W. Neale, A. C. Clague and H. R. Wynne-Edwards
Geological Survey of Canada Paper. 75-6. 51 p., 1975. $2.00.

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We all know that there have been exhaustive investigations of Science in Canada in the past decade by a variety of bodies. Some, including those of the Science Council - of which *Earth Sciences Serving the Nation* is a shining example - were prepared by members of the scientific community themselves. Others were forced upon us by outsiders. Although Senator Lamontagne's volumes, which fall within this second category, are a good example of the lack of understanding that non-scientists have of us, they served to illustrate the enormous importance of responsible internal government by scientists themselves, and the enormous importance of informing the public, including politicians, of our successes, our failures, and of our concern within our own realms of expertise applied to national problems. Roger Blais' Science Council volume, referred to above, attempted to say where we, the earth sciences, were at that time. Perhaps this is too personal a view; I am really saying what I have used it for when preparing lectures, and when I have needed to know something particular, say, about the mineral industry. *The Geosciences in Canada 1974* is a very different sort of insider's view of the Earth Sciences in Canada now. Earthy people across the country were asked by their scientific societies to give an account of their specialty, and to revise it in the light of other experts' comments. The ensemble was edited by Ward Neale and Lexi Clague and in the process inevitably reduced in length. The Geoscience Council prepared Part I, *Analyses and Recommendations*, based on the reports by discipline; some facts concerning funding and society activities within the earth sciences complete the volume. It was discussed in December 1974, with senior officials of the Department of Energy, Mines and Resources which had paid for the preparation of the report under contract, and they then decided to aid the Council in printing and distribution.

I invite the reader first to skim the reports by discipline; he or she will find them - expectedly - uneven in their presentation. Some are pedestrian: "Studies of X and Y are important to the economic welfare of the nation . . . new financial resources are needed". Some are blunt: ". . . none of the major developments in glacier science has occurred in Canada; indeed, most of them occurred in the United Kingdom, a country without glaciers". Some appear false, or if true, horrifying: "Activity (in modern sediments) was slight . . .". The common themes are lack of excellence (not lack of competence), lack of people, lack of funding, excessive dominance by government, and restrictive legislation (by government). Now, breast-beating is a fair and honourable exercise among modest gentlepersons, and it is certainly true that, for a country with so large an area of rocks to study, our contribution to the development of the blessed paradigm of plate tectonics was restricted to the - very high - contributions of a very few individuals. That of course is also true of the United States and the United Kingdom . . . and the U.S.S.R. made no contribution. My regrets on reading the reports by discipline are (1) that so few *accomplishments* are reported - there must have been two, because two Past-Presidents medals have been awarded by GAC, and they are awarded for excellent science; and (2) that so few solutions to the problems of lack of excellence, lack of people, and so on are suggested.

The reader should now seek out Part I, *Analysis and Recommendations.* The joint authors have appreciated the strengths and weaknesses, the fits and starts of the individual races which make the meet, and attempt to give us guidelines for progress. They, too, can be blunt: "The message is plain . . . our facilities and personnel are spread too thinly . . . to realize their full potential". They too can bless Mother: ". . . the Department of Energy, Mines and Resources should continue to support and foster geoscience research and development . . ." (Really!). But an attempt *is* made to seek causes of and solutions to the lack of excellence and the lack of people needed to develop the earth sciences. The authors give us one solution - increase the level of activity in the earth sciences as a whole: "no other group of disciplines (besides the earth sciences) will be so vitally important (to Canada) in the twenty-five years remaining in this century". They propose that this be done *at the expense of other activities and by establishment of centres of excellence.*

I ask: "what other activities?" Biological Sciences - with environmental problems in all rivers and lakes where Canadians settle? with hordes of wishing-to-be doctors and dentists flooding Biology departments? Social Sciences - with the problems of the multinational corporations upon all nation-states? Languages - with Mr. Trudeau's aim declared in his professional days that all citizens shall have the right to communicate federally

in both our tongues? Welfare - with a guaranteed income promised by all political parties? Health - when fear of death has now far outstripped fear of Russians? This route must be one of marginal gains, unless perhaps the towers of Physics and Chemistry can be breached, or the Government be persuaded to trust those outside Government to work on behalf of the people of Canada.

Where will we establish centres of excellence? Who will starve if the pie is no larger than the pizza will go? Who will direct the location of these activities? Some answers are obvious - we would not set up a centre for Precambrian studies in Halifax. But centres of excellence are made of excellent people, and excellent people settle in remarkable places for a variety of reasons. I wonder if it would not be superior policy to fund the best people to do what they want to do, wherever they are? If we do establish centres of excellence, indeed if we massively fund excellent people, who will decide where the axe falls? In the sphere of funding of university research from NRC sources we are now at the point where, through lack of funds, mistakes are being made - inevitably, judgments have to be made - and people who demonstrably deserve support at a modest level at least will receive no funds. Which new young scientist won't we start? How soon must progress be shown? What is progress - refereed papers? a mine? My personal view is that we have no choice but to make harsh judgments, as honestly as we can, provided that a variety of sources of funds exist. It is bureaucratically nice and tidy to channel all national earthy funds through a single earthy committee. It is, however, very dangerous, because inevitably this single committee will reflect a few of many possible sets of biases, and scientists must be protected from them. It is a great shame that the Defence Research Board is to cease funding university activities; it would be better if there were several funding agencies so that the talented are not overlooked in a moment's aberration.

The Canadian Geoscience Council has been courageous and their Report to the scientific community is well worth the effort, by the individual scientists, and by Neale, Wynne-Edwards and Clague. In one sense it is less valuable than the Blais report - there is little data. But in another sense it is more valuable because nasty questions are asked, and nasty comments are made. I hope that in another report more thought is given to the answers to the questions and that in the Golden Age of the Earth Sciences to come we will need no nasty comments.

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Twice a year the Geological Survey of Canada provides a summary of its activities. Since 1973 the summary volumes have been produced in an attractive 8 x 11 inch format, illustrated by many high-quality line drawings and photographs.

No single person can do an adequate job of reviewing a volume with as large a technical scope as the *GSC Report of Activities*. Just because of the scope and volume of work reported, however, it seems important that the Report should be drawn to the attention of its potential readership. After some general comments on the purpose and style of the volume, there will follow a few notes on particular contributions that happened to interest this particular reviewer. Hopefully, future volumes will be reviewed by other reviewers whose technical interests will differ greatly from my own.

My first comment is that the value of the Report could be increased if the purpose of the Report was more clearly defined. Who is the Report written for? Certainly not the general public, for this is clearly a technical report. But presumably the report is not written mainly as an internal document, for the information of the GSC's own officers. I take it that the "target" readership is professional geologists at large, and mainly those active in geological studies in Canada, and employed by mining and petroleum companies, provincial departments of natural resources and the universities.

The reports on individual projects have wisely been organized in this volume into several major groups (Appalachian geology, Cordilleran