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Proud Heritage: People and Progress in Early Canadian Geoscience

Christy Vodden

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REVIEWS

Proud Heritage: People and Progress in Early Canadian Geoscience

Edited by R.W. Macqueen
Geological Association of Canada, Geoscience Canada Reprint Series 8, 2004, hardcover, 252 pages, $65 ($52 for GAC members).

Reviewed by Christy Vodden
398 Hinton Ave. S., Ottawa, Ontario K1Y 1B1

Everyone interested in the history of geoscience in Canada (and that would be everyone reading this magazine, I hope) owes a huge thank you to Roger Macqueen, Gerry Middleton and the Geological Association of Canada for pulling together a widely scattered collection of articles on that very topic and supplementing it with valuable references for further reading.

The earliest geological observations of the part of the planet that has become Canada were made by explorers such as Martin Frobisher and Samuel Champlain as footnotes to their broader agendas of discovery. Two centuries later, in the1800s, the need to develop resources was imperative to the future of the Province of Canada, and interest in natural history was blossoming at a fabulous rate. This was the age of the self-taught geologist, and foremost amongst them was the Geological Survey of Canada's founder William Logan, who was proclaimed Canada's greatest scientist in "The 100 Most Important Canadians in History" issue of Maclean's magazine in 1998.

Under Logan's leadership and example, the following generations of geologists systematically traversed the vast Canadian wilderness, and gathered the knowledge needed to build the nation. Until well into the Twentieth Century, these explorer-geologists brought back much more than information about the rocks and minerals. They catalogued the forests, soils, potable waters, safe harbours; they drew the topographic maps, recommended routes for railways, collected specimens of plants and animals, and transcribed languages and customs of the Aboriginal peoples they encountered. Their names dot the Canadian landscape: Mount Logan, the Selwyn Mountains, Dawson City, to name but a few. The work they did was so broad in scope that it was spun off into many other institutions, most directly and notably, the national museums of Nature, Civilization, and Science and Technology. Proud heritage, indeed!

Funny thing, though, if you check most popular texts on Canadian history, you will find only the barest mention made of the role of these trailblazers and nation builders. There are many reasons for this glaring omission from the official record, with one being the difficulty in tracking the information. There are some excellent texts, mostly out of print, if you know what to look for. Otherwise it's all there in the annual reports of the GSC and the records of the provincial and territorial surveys; it's in the memoirs of the handful of geologists who took the time to write them; it's in correspondence and field journals held in dozens of archives across the country. In other words, if you have lots of time, a healthy travel budget, and the tracking skills of Hercule Poirot, it's all there for the finding.

In the 1970s, the GAC started to tackle these twinned problems of low recognition of the geoscience community's contribution to the development of Canada and the difficulty in finding this information. Short articles on illustrious geoscientists were sought and published, first in the GAC Proceedings and later in Geoscience Canada, which was started up in 1974. Understandably, these volunteered articles were written for many reasons personal to the author: to celebrate a hero or mentor, to build a reputation of one whose work had been overlooked, or to reclaim a reputation deemed to have been unfairly judged.

"Proud Heritage" pulls together this eclectic collection in one handy volume and adds to it many other valuable resources for those wishing to delve further. It starts with articles on four people, untrained in geology, who nevertheless made a contribution to geology in Canada. This is followed by articles that chronicle various aspects of the life, work and contribution of close to 30 geoscientists who were pioneers and leaders in the Nineteenth and Twentieth Centuries. These range from such well-known luminaries like Logan and George Dawson to those who should be better known. The final section looks at the origins of various organizations within the geoscience community and some early studies. Importantly, each article includes a list of the references used.

Gerry Middleton's introduction is a treasure trove of other sources for more detailed reading, much of it annotated by him. He does not limit the bibliography to geoscience. By providing key references for the broader history of science and of Canada, he enables those interested to place the contribution of geoscience into a broader context. He also provides a fascinating timeline of Canadian geology from 7000 B.C. to 1965 -- a good exercise for the entire geoscience community would be to look at this list with a view to adding to it (the PDAC's founding in 1932 is missing, as is the opening in 1918 of the

GSC's Vancouver office), and to build it from 1965 to present. Finally, he has pulled together two lists of historical interest: these give the numbers of permanent employees of the GSC prior to 1900 and list geologists active in Canadian universities established before 1900.

Even the casual reader will find much of interest in this volume. Be warned, though, that the articles vary widely as to scope and style. Some take a magnifying glass to a single facet of their subject's life, whereas others give an aerial view of an entire career and its impact. A few articles are so precise as to the provenance of each point made that the reading experience is akin to eating spinach that has not had all the sand washed off. Most, however, are a sheer delight to read from start to finish. The nice thing about a collection like this is that if one article proves heavy slogging and is far from your interest zone, you need only flip forward a few pages to find a more congenial one. The only other caution is that most of the articles are reprinted from the original, so the typesetting varies as the style guide changed at Geoscience Canada. Those articles from the mid-1980s, when our collective eyesight was much sharper, are printed in a very tiny type.

On a final note, I hope that the GAC will promote "Proud Heritage" strategically outside the geoscience community, and ensure that all academic libraries, whether public or private, are encouraged to add it to their holdings. This should increase the chances of future writers of Canadian history finding and using this valuable resource.

Changing Sea Levels

by David Pugh
Cambridge University Press
The Edinburgh Building
Cambridge CB2 2RU
England
ISBN0521532183; 2004
£70 hardcover, £30 paperback

Reviewed by Chris Garrett
Department of Physics and Astronomy
University of Victoria

"Down with sea level rise" was the message on a placard that greeted the author of this book during a conference in the Maldives. As he explains in the preface to this interesting monograph, sea level rise associated with climate change is a matter of considerable public interest and concern, so this book should be a valuable reference for more than the undergraduates at whom it is primarily aimed.

David Pugh is the well-qualified author of the comprehensive 1996 "Tides, Surges and Mean Sea Level", now sadly out of print. This new volume is a slimmed down version, with new material on satellite altimetry and the effects of climate change. The author's easy and clear style makes the book a pleasure to read, although the desire to minimize the mathematical content means that the theoretical and dynamical underpinnings of many topics are omitted. Chapters end with thought-provoking questions, with answers and discussion given in an appendix. Pugh also provides helpful lists of further reading and refers the reader to more material at http://publishing.cambridge.org/resources/0521532183.

The book covers changes in sea level on time scales from minutes to tens of years. Thus, it excludes wind waves at one end of the spectrum and the effects of very long-term tectonic changes at the other, focussing on the effects of tsunamis, tides, storm surges and gradual changes over the last 200 years and in the future. The latter include the effects of vertical land movements as the earth recovers from glacial loading and also the response to changing ocean volume associated with glacial meltwater and ocean warming.

After an excellent opening chapter on observational techniques, from tide poles to satellite altimetry (timing short radar pulses to measure the height of the sea surface), more than half the book is, perhaps surprisingly, devoted to tides. The discussion of these is very good, with traditional material clearly explained, and also, to my delight, some discussion of important and interesting aspects that are typically ignored. For example, Pugh discusses the "age of the tide", the lag of spring and neap tides behind full and new moon at which the solar and lunar tidal forces combine. The lag is typically a day or two, and explained here in terms of the time it takes the ocean to respond to the forcing. (It actually provides indirect information on the ocean's proximity to resonance and the amount of friction.) Pugh also emphasises the "nodal" variations of the tides over the 18.6 year cycle in which the moon's maximum declination (angle above or below the equator) varies between 18.3 and 28.6 degrees. This produces major changes in the lunar diurnal (once a day) tides, and so is important at places such as Victoria, where diurnal tides dominate.

I was also pleased to see a reference to David Cartwright's wonderful 1969 study of the tides at the island of Saint Helena in the South Atlantic, 208 years after Charles Mason (of Mason-Dixon fame) assisted Nevil Maskelyne in measuring sea level changes there; the project compensated for the cloudiness that prevented them from achieving their primary objective of observing the transit of Venus across the face of the Sun. Although Pugh does not report on this, Cartwright found a significant change in the timing of the diurnal tides, an observation which will help us check on the global tidal models that are beginning to be used to predict changes in tides over much longer (interglacial) time scales.

Near the coast, of course, tides can change because of port construction and landfill. A more natural change has occurred in the Bay of Fundy, where today's world record tides (albeit challenged by observations in Ungava Bay, at least keeping this an internal Canadian dispute!) have built up over several thousand years as mean sea level has risen. This topic is discussed in Pugh's final chapter, on Tidal Influences, which will be of more interest to the geological reader than much of the physical oceanography. Here, we find an introduction to the fascinating effects of the tides on sediment transport, plants and animals, and a brief discussion of the empirical relationship between the cross-sectional area of the entrance of an inlet and the product of its surface area and tidal range. As with some other topics in the book, though, this would have benefited from a more quantitative dynamical interpretation.

The discussion of other factors affecting sea level is good but less detailed than for the tides. For example, the role of wind-driven changes includes a review of how local wind-driven cur-