

# The Evolution of North America

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[See table of contents](#)

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Gélinas and others discusses the significance of the structural and lithologic features of ultramafic lavas and volcanoclastic rocks in Quebec. This and two other papers on komatiites by Schwarz and Fujiwara and by Schau give a large amount of valuable information on these fascinating rocks.

W. T. Jolly describes the relations between Archean lavas and intrusive bodies in the Abitibi Greenstone Belt of Ontario and Quebec. The trends from tholeiitic to calc-alkaline compositions that developed in both places resemble to a remarkable degree those seen in Cenozoic orogenic suites. Jolly uses mass balance calculations to relate the trends to fractionation in shallow reservoirs, but the lack of trace-element data make the interpretation less convincing than it might be. The structural setting of Archean volcanism is considered in a paper by M. B. Lambert, who shows that the distribution of igneous rocks and sedimentary basins in the Slave Province has been controlled by long-continued faulting. The evolution of the system with time is illustrated by examples from several thick sections through the belt.

Many of the features of Archean volcanism are synthesized by H. D. B. Wilson and M. G. Morrice, who propose that the sequences of lavas, intrusions, and ore mineralization are consistent throughout the shield. The patterns are explained as the result of progressive crystallization of gigantic bodies of magma produced by a meteoritic bombardment similar to that which has been proposed to explain postulated magmatic oceans on the moon. One problem that will be apparent to geologists working with younger rocks is the marked similarity of the Archean compositional sequences to those observed in Cenozoic rocks that could not have been the products of such catastrophic events.

W. R. A. Baragar presents an excellent survey of volcanism on the stable crust and distinguishes three types of rocks that have distinctive volcanic forms, geochemical compositions, and tectonic relations. From comparisons with modern analogues, he concludes that the plateau basalts are related to plumes and crustal rifting. J. C. Green arrives at a similar interpretation of the Keweenaw rocks of the Lake Superior region. Both papers are loaded with concise

information, and whether or not one likes the interpretations, the data are invaluable.

The final section, which deals with the oceanic regime, consists of three papers, one by J. M. Hall and his co-workers on the oceanic crust adjacent to Canada, one by D. B. Clarke on the Tertiary province of Baffin Island, and the last by K. D. Sullivan and C. E. Keen on the Newfoundland seamounts. All three are concerned with problems of the evolution of the oceanic lithosphere and island chains.

The volume is very well organized. Apart from a few annoying grammatical errors, such as the inverted use of adjectives and nouns (e.g., "granite intrusives," "andesite volcanics"), the editors have put together a very readable book. Overall, the most disappointing part of the book is the herd instinct of the authors and their tendency to use analytical data, much of it of miserable quality, as a substitute for a thoughtful analysis of geologic evidence. There is an almost comical pattern in many of the papers. A group of rocks is described with only passing mention of their geologic relations; wildly scattered compositions are plotted on AMF and alkali-silica diagrams, and the rocks are thereby interpreted as coming from an island arc, hot spot, or spreading axis. On this sort of evidence, authors deduce subduction zones, plate motions, opening and closing of oceans, or even planetary catastrophes. The reader who views the volume from the outside and is impressed by the remarkable features of ancient volcanic regimes cannot help but feel that much more would be learned if the efforts expended in forcing rocks into fashionable models were devoted to an impartial analysis of what was really going on when the rocks were laid down.

MS received March 2, 1978

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## The Evolution of North America

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By Philip B. King  
*Princeton University Press, 197 p., 1977*  
*(2nd Edition).*  
 Cloth U.S. \$25.00, Paper U.S. \$9.50

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Readers familiar with the first edition of *The Evolution of North America* will find the second edition remarkably similar and will have to read very carefully to find the revisions. The book has not been re-planned in the light of plate tectonic interpretations of North America. It is only eight pages longer than the first edition, and with few exceptions, uses the same Chapter and Section headings as the 1959 edition. The revisions therefore, mostly consist of small deletions and additions to individual sections or paragraphs as demanded by our present understanding of plate tectonics. The result does not integrate plate tectonics into the "Evolution of North America" as broadly as one might wish.

The original strengths of the book remain, however, and it is a superbly readable synthesis of North American geology. The anecdotes concerning some of the early explorers and geologists continue to enliven the book and entertain the reader. The absolute minimum of jargon and local stratigraphic terminology make the book easily readable by beginning students onward. The illustrations, now all in metric, consist entirely of hand-lettered line drawings, identical in style to those in the first edition. About 23 are new, 11 significantly altered and 9 deleted making a new total of 109. In many of them, the lettering almost blurs into the legend, or is superimposed on the legend, in a manner that detracts from the usefulness of the illustrations. They consist mostly of maps and cross-sections, and one could perhaps have asked for more "sequential" diagrams demonstrating the inferred evolution of various areas - there are only about eight such diagrams in the book.

The second edition, then, remains in the strongly descriptive mould of the first edition, and King has been very careful not to be too speculative, nor to pass on currently incomplete plate tectonic interpretations that may soon become outdated. Unfortunately, by following this pattern, King does not transmit the excitement of applying plate tectonics as it is presently understood to the interpretation of the geological record.

If you already own a copy of the first edition, you will perhaps be disappointed by the second. A thorough updating would have been superb, but a piecemeal updating is less than one could have expected. If you do not own a copy at all, buy the second edition to enjoy the literate style of writing and immense breadth of synthesis of North American geology. Finally, Canadian readers will be surprised and disappointed to find that less than six per cent of the book is devoted to the Canadian Shield – rather surprising in view of the physical extent of the shield, the length of geological time represented, and the amount of research devoted to shield problems since the first edition was published.

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#### Note

The Book Review Editor apologizes for the following errors in A. E. Beck's review of the *Bowels of the Earth* (Vol. 5, No. 1). Page 46, column 2, seventh line from the bottom should read:

$W = W_0[1 + (4/5 \xi - 1) p^4]$ . Page 46, column 2, fifth line from the bottom should read:  $p=r/a$ . Page 46, column 3, line 1 should read:  $(4/5 \xi - 1)$ . Page 46, column 3, line 40 should read:  $p=1$ , to  $p=0$ . At  $p=1$ ,  $r=a$ . . . . Page 46, column 3, line 42 should read:  $p=0$ .

## The Making of Geology: Earth Science in Britain 1660-1815

By Roy Porter  
Cambridge University Press,  
288 p., 1977.  
\$18.95

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In the development of any amateurish undertaking into a professional pursuit some books dealing with the particular topic of study stand out as prominent landmarks clearly showing the route that will be taken in that development. Roy Porter has given us such a book for the history of geology. This is the approach of a thoroughly professional historian to a part of the history of science that until only about a decade ago was the domain of earth scientists with a personal interest in the past accomplishments of their predecessors. Of course, there are other books with an approach similar to that of Porter. In the present context perhaps the most significant to mention is *The Meaning of Fossils* by Martin Rudwick as it was he who in part supervised Porter's Ph.D. research that is the foundation of *The Making of Geology*. But Porter carried the historiography of geology still a step or two farther down the road of professionalism than Rudwick.

Roy Porter convincingly shows that attitudes towards the Earth and its investigation underwent great changes in Britain between 1660-1815, the period dealt with in the book. Being a historian, he sees as his central problem the often assumed aspects of the culture of science, such as openness, progress, objectivity, and impersonality. The scientific questions asked about our planet, and the manner in which these questions were dealt with, changed markedly in time. It can be shown that such changes and the emergence of geology as a science is particularly dependent upon deep social and institutional foundations. One therefore has to understand the development of geology

in terms of the society in which it was rooted. Only then does the history of science become, as it should, "much more than a tale of anticipations and precursors, founding fathers and who described what first".

*The Making of Geology* deals with three distinct periods: 1660-1710; c. 1710-1775; c. 1775-1815. For each the intertwining of society and earth sciences is discussed in detail for Britain which, however, is rightly not considered in isolation from the European mainland. Elizabethan England saw its mines developed by Germans trained in the tradition of Agricola. Whereas in Continental Europe it was the nobility who supported scientific institutions for its own purposes, in Britain it was the private enterprise of natural philosophers that founded the Royal Society of London in 1660.

The second half of the seventeenth century saw not only the rise in Britain of scholarly societies but also that of the museum and natural history collection. It was then that men like Woodward and Llwyd responded to the ideals of the new Baconian science by travel and first-hand observations. Correspondence as a means of communication between kindred souls flourished. Questionnaires became a fashionable research tool: Llwyd distributed 4000 of them for his survey of Wales. The society at large, however, appears to have displayed mainly indifference. "To what purpose so many Words about so trivial a Subject?" asked John Ray. Do not many non-geologists unfortunately ask that same question still today?

It is popularly assumed that the first three-quarters of the eighteenth century were a dark age in the intellectual life in Britain with *Tom Jones* an expression of its level of interest. Such a view ignores the upsurge in middle-class practical, rational, scientific culture associated with commercial and industrial enterprise. Again it is the modern historian who can bring scientists interested in history but lacking the broad cultural-societal perspective of the past back on track. "To find no peaks of achievement and to conclude thence that it was a period of decline is to be victim of false historical expectations – in particular 'great man' interpretations of history."

By the mid-eighteenth century Romantic travel literature flourished; tourism and holidays became institu-