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Chemical Evolution of the Early Précambrien

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The philosophy behind the book is one with which we have great sympathy. It allows the reader to have a superb visual impression of what the surface of the Earth's crust looks like in an area where new crustal formation is in progress. Photographs give the reader the opportunity to make up his own mind about the meaning of features, and are also an efficient way of transmitting information compared with the written word.

The photographs are formally divided into two groups, those illustrating submarine volcanic products and a second group illustrating faults and related tectonic features. There is in fact a third group hidden at the end of submarine volcanic products. This set of 17 drawings and photographs are of features of pillow crust. What is impressive here is the manner by which lava tubes elongate. They often do so by annular splitting of the solid surface of the tube followed by the broken halves being forced apart by new material. This new material is usually added symmetically at a narrow central zone, at the location of the original annular crack. The form of the surface of the new part of the tube depends on the addition rate, with much minor cracking at slow rates (photographs 110 and 111, for example). The whole process mimics in so many ways on a small scale the features of the surface of a Mid-Ocean Ridge.

The section on faults and related tectonic features is fascinating in that a progressive evolution in fine scale tectonic style can be traced from the axis of the rift valley, where new material is added to the walls. Fissures exactly of the Icelandic gja ('gyow') type are the first tectonic manifestations. (Nowhere is this word written phonetically to help the reader who is ignorant of Icelandic.) With distance from the volcanic axis of the valley the fissures show vertical relative movement of their walls, graben structures between adjacent fissures, and sometime rotations of adjacent blocks. One of the surprises of the photographs of open fissures is to find that fissures generally propagate by cracking pillows apart rather than following pillow margins (for example, photograph 148).

In summary this is a most valuable (but not very expensive!) book for all students of the ocean floor and indeed for all geologists who worry about how new crustal plate forms on the scale of normal surface geological mapping, rather than seen from a distant geophysical viewpoint.

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Chemical Evolution of the Early Precambrian

Edited by Cyril Ponnamperuma
Academic Press Inc., New York, San Francisco, London, 221 p., 1977
US $13.50/£9.60

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This volume contains 22 papers presented by geologists, paleontologists, biologists, and chemists at the second colloquium organized in 1975 by Ponnamperuma at the Laboratory of Chemical Evolution, University of Maryland The symposium focussed on the questions "When did life begin?" and "Is there any evidence for prebiotic processes on the earth?".

The title of the book is somewhat of a misnomer, inasmuch as the emphasis is decidedly on biospheric rather than lithospheric evolution, and the topics discussed are not restricted to the Early Precambrian (= Archean of Canadian usage). In fact, only about one third of the papers deal directly and specifically with phenomena and events of this interval; about another third concern general problems that span the whole of the geologic record; the remainder are on post-Archean subjects, chiefly Proterozoic. The diverse topics discussed include: origin of the atmosphere, early Precambrian weathering and sedimentation, Archean geochronology, continual evolution of sial throughout geologic time, regional geology and stromatolites of the Slave province, early Archean carbon, condensed phosphates from abiotic systems in nature, organic geochemistry of Permian hydrocarbons from Brazil, stable isotopes of hydrogen in Precambrian organic matter, terrestrial oxygen evolution, Archean and Proterozoic microfossils and stromatolites, protection of blue-green algae against UV, modern procaryotes and Precambrian analogues, criteria for biogenicity, synthetic organic microstructures as models for early protobionts, artificial silicification of microorganisms, synthetic organic microstructures, late appearance of metazoans, metaphytes and fungi, and procaryotic biochemistry.

The papers are for the most part, short summaries (some with abstracts, some without, some merely abstracts) of research published in more detail elsewhere during the last three years. The reader wishing further data will have to consult these more comprehensive articles. By bringing the material together in one volume the editor and publishers have provided a compendium for geologists and graduate students who want a glimpse of recent developments in Precambrian biogeology. The book has a hard cover and is very reasonably priced, in part no doubt due to printing by offset from type-written copy. References are given at the end of each paper in abbreviated form, without title; they could have been grouped in a bibliography at the end of the book, citing full titles. There is a detailed table of contents, and a useful subject index. The editing is uneven, and many minor typographical errors remain, such as the reference to very old rocks older than 100 million years (instead of 3100 m.y.) on page v, and cyanophyte filaments 10 m in diameter (instead of 10μm) on p. 182. A more serious flaw is the lack of a synthesis or summary; it would have been helpful if the editor had included a chapter summarizing the main conclusions and their relevance to the two main questions to which the coloquium addressed itself. It is left to the reader to organize the diverse facts and ideas presented.

The book gives a useful perspective for geologists and paleontologists by presenting, under one cover, the diversity of views and approaches followed by active specialist workers in attacking the problems of Precambrian biospheric evolution.

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