

Economic Geology and Geotectonics

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Economic Geology and Geotectonics

Edited by D.H. Tarling
Halsted Press, 213 p., 1981.
 \$54.95

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Economic Geology and Geotectonics presents the views of the "British School" on the impact of global plate tectonics in the area of economic mineral deposits genesis and mineral exploration strategy. It is aimed both at professionals responsible for the planning and evaluation of exploration programs, and at senior undergraduate and postgraduate students. The book consists of contributions by eight authors including J.P.N. Badham, R.J. Bailey, R.D. Beckinsale, J.R. Cann, G.A.L. Johnson, A.H.G. Mitchell, R. Stoneley and D.H. Tarling. Lest the usual North American view that economic geology is synonymous with the geology of metallic mineral deposits prevail, be advised that four of the nine chapters are concerned with petroleum geology and coal. There are two overview chapters: one introduces the book with a succinct review of plate tectonics and the other is a concluding chapter on paleoclimatological considerations. The remaining three chapters cover ore deposits of the ocean crust, ore deposits associated with subduction zones and ore deposits in sedimentary rocks.

The three chapters dealing with petroleum (Bailey and Stoneley) contain much material normally found in texts on petroleum geology. Source rocks, cap and reservoir rocks, traps and processes of entrapment, the effects of heating on maturation and the evolution of sedimentary basins receive attention. Plate tectonics is woven into this discussion as a basis from which to study the evolution and structural development of petroleum-bearing basins. Whether the discussions of petroleum geology are presented in satisfactory depth and breadth will probably depend on the background of individual readers. As a demonstration that plate tectonics provide an additional tool to evaluate the petroleum potential of sedimentary basins, these chapters are highly successful.

The chapter on coal (Johnson) is developed in a comparable manner to those on petroleum. Coal geology as such receives some attention while the main emphasis is on the paleogeographic set-

ting of the major coal fields of the world and the part played by plate tectonics in their evolution.

Metallic mineral deposits are covered in three chapters dealing with ore deposits of the ocean crust, ores in subduction zones and metal deposits in sediments. The discussion on ocean crust ore deposits (Cann) first considers processes during the formation and evolution of ocean crust and then reviews mineralization in ophiolites and ocean floor sulphide deposits of the type found in Red Sea brine pools. The discussion is brief and deposits are not described in much detail. Rather, attention focuses on those aspects of ocean floor deposits which are readily explained by plate tectonic mechanisms but whose origin is otherwise obscure.

Ore deposits associated with subduction (Beckinsale and Mitchell) consider familiar ore types such as porphyry coppers and Kuroko ore in terms of four major tectonic settings: magmatic arcs, back-arc magmatic belts, outer-arc magmatic belts and foreland fold-thrust belts. The authors conclude that relationships between plate convergence, magma generation and metal concentrations are obscure, and do not at present, provide the best assessment of mineralization potential.

Ores in sediments (Badham) is one of the longer chapters in the book. It covers placer deposits, iron formations, red-bed copper deposits and sediment host zinc-lead deposits. The discussion provides a balanced and up-to-date review of the principal genetic arguments relevant to each deposit type, and examines geotectonic implications in some detail. It is concluded that a relationship between geotectonics and mineralization always exists but it may be too general to help the explorationist.

Whether the book will be seen by explorationists as of direct value to their immediate problems is somewhat problematical. What *Economic Geology and Geotectonics* does do, and in a highly competent fashion, is present an assessment of the impact of plate tectonics on concepts of mineral deposit genesis. As a reference or supplement to courses on ore deposits for senior undergraduate or graduate students, the book is strongly recommended. As the principal text for the typical North American senior undergraduate course in mineral deposits, the main theme is too specialized and the assumed background is too extensive.

MS received September 16, 1981.

Earthlike Planets: Surfaces of Mercury, Venus, Earth, Moon, Mars

By Bruce Murray, Michael C. Malin
 and Ronald Greeley
W.H. Freeman and Company,
387 p., 1981
 \$24.95 US Hardcover, \$14.95 US Paper

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In the past decade the volume of information upon other planets and moons of the Solar System has increased by many times. Summary books are appearing at an increasing rate including, most recently, texts in comparative planetology written from the earth scientists' viewpoint rather than that of the astronomers! This is the newest of them, by three leading planetologists trained in geology. Their bias is made plain, for the Moon is always described as a planet, which it is in the sense that it belongs to the same class of large, differentiated rocky objects as Mercury, Venus, Earth and Mars.

The book is in four parts, beginning with a review of planetary origins that emphasises hot, heterogeneous accretion concepts, plus summaries of main features of the designated planets. These contain unnecessary repetition. A second part summarises exogene and endogene processes that mould the surfaces. The exogene chapter covers impact cratering, mass waste, eolian and fluvial activity; periglacial activity is a glaring omission and there is a general lack of explanatory reference to terrestrial examples of eolian and fluvial forms. By contrast, the endogene chapter is amply referenced to Earth. It covers plate tectonics, volcanic landforms, extensional and compressional structures.

The third part outlines stratigraphic and morphologic histories of the surfaces of the Moon, Mercury and Mars. Discussion is quite detailed and controversial matters are fairly dealt with, but this part seems premature. The histories rest upon a few lunar dates calibrating cratering flux rates there, and the assumption that lunar results apply elsewhere. More attention to analysis of morphology and distribution and less to highly inferential histories would seem appropriate, given the present state of knowledge. Perhaps some planetologists are repeating the Davisian error in the history of geomorphology - "assume the process-form rela-