terminology a bit frustrating, although radio scientists, plasma physicists, and astrophysicists should discover some subjects of interest. This book does provide clear evidence that the investigation of the polar magnetosphere continues to be as dynamic as the region of space under study.

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Sedimentary Processes

Geochemistry of Sedimentary Ore Deposits. J. BARRY MAYNARD. Springer-Verlag, New York, 1983. xii, 306 pp., illus. $29.80.

In many respects this book is a sequel to a recent book, *Sedimentology of Shale* by Potter, Maynard, and Pryor, also published by Springer-Verlag. Unlike the earlier work, however, this book focuses on processes of sedimentary ore formation, with two principal objectives—to acquaint sedimentologists with sedimentary processes that are often best represented in sedimentary ore deposits and to give greater emphasis to aqueous geochemistry in the study of sedimentary ore deposits. To consider deposits that do not sensu stricto have a sedimentary origin, the author has expanded the definition of "sedimentary" to include ore deposits hosted by sedimentary rocks or soils. Though this redefinition may appear unconstrained, the author has taken care to consider only deposits formed at or near the earth's surface under low to moderate temperatures.

Chapter 1 gives a brief introduction to the principles of stable isotope chemistry, thermodynamics, and the applications of predominance-area diagrams. Subsequent chapters consider sedimentary deposits of iron, copper and silver, aluminum and nickel, manganese, uranium, and lead and zinc and volcanic-sedimentary deposits. The types of deposits considered range from those accumulated at the sediment-water interface (for example, iron formations, sedimentary manganese, and exhalative sediment-hosted and volcanic-sedimentary sulfide deposits) to those precipitated from ground waters (for example, infiltrational uranium) and diagenetic fluids (for example, copper in sandstone and shale) and those formed during tropical weathering (for example, aluminum and nickel laterites). Deposits of sedimentary origin excluded from consideration are phosphorites, evaporitic deposits, clastic-hosted barite, and placers other than uranium and gold.

Most chapters consider the mineralogy, geochemistry, petrography, and local stratigraphy in turn and end with a discussion of genetic theories drawing on some of the more extensively studied and often most representative deposits as examples. In discussions of deposits having minerals of supergene origin (for example, iron formations, copper in sandstone), a separate section is devoted to supergene processes. Likewise, the tectonic setting is emphasized for polymetallic volcanic-sedimentary deposits. Overall, the treatment of each type of deposit is balanced, although the role of tectonic processes in the formation of exhalative sediment-hosted lead and zinc deserves greater consideration. Extensional tectonism is probably the single most important process controlling basin formation, the episodic discharge of metalliferous fluids onto the sea floor, and ultimately the precipitation and preservation of lead-zinc sulfide deposits.

Much emphasis is placed on aqueous geochemistry in understanding the manner in which ore-forming elements are transported and precipitated. Reference is commonly made to equilibrium relationships illustrated with Eh-*p*H or activity diagrams constructed under a given set of conditions. When considering some deposits, particularly those formed at or near the earth's surface at low temperatures (for example, infiltrational uranium, sandstone copper), these diagrams are effective in predicting their mineralogy and mineral zonation. The higher-temperature (250° to 350°C) hydrothermal systems responsible for the formation of exhalative sulfide deposits have been modeled by several workers in the field but are considered only briefly here. When lower-temperature ore-forming fluids are examined, it is not always clear how the initial compositions of metalliferous fluids were estimated or whether or not they are realistic for a particular type of deposit. Furthermore, because ore formation is commonly a dynamic process, the products of which overlap in space and time, there are inherent difficulties in using static models to simulate an ore-forming system. The value of this approach is that it places constraints on the fluid composition and therefore geologic environment necessary to generate a particular mineral assemblage.

The book is clearly and concisely written and well illustrated with figures. Errors are rare and generally minor with the exception of figure 6-2, where the wrong figure has been reproduced from an earlier publication. References are for the most part up to date and a fair representation of the literature. When describing deposits that were discovered tens of years ago, the author very wisely cites some of the older papers documenting the geology, mineralogy, and petrography in greater detail.

The book should prove valuable not only to the sedimentologist seeking to understand sedimentary processes, but also to the economic geologist and geochemist attempting to unravel the often complex processes of sedimentary ore formation.

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Books Received

Air Pollution—Physiological Effects. James J. McGrath and Charles D. Barnes, Eds. Academic Press, New York, 1982. xiv, 354 pp., illus. $44. Research Topics in Physiology, 5.

Animal Behaviour. Ecology and Evolution. C. J. Barnard. Wiley-Interscience, New York, 1983. 340 pp., illus. Paper, $19.95.

Anionic Polymerization. Principles and Practice. Maurice Morton. Academic Press, New York, 1983. xii, 244 pp., illus. $39.

Annual Reports on Fermentation Processes. Vol. 6. George T. Tsao, M. C. Flickinger, and Robert K. Finn, Eds. Academic Press, New York, 1983. x, 380 pp., illus. Paper, $35.

Annual Review of Earth and Planetary Sciences. Vol. 11. George W. Wetherill, Arden L. Albee, and Francis G. Stehli, Eds. Annual Reviews, Palo Alto, Calif., 1983. x, 510 pp., illus. $44.

Applied Clinical Pharmacokinetics. Dennis R. Mungall, Ed. Raven, New York, 1983. x, 448 pp., illus. $46.

Asymptotic Realms of Physics. Essays in Honor of Francis E. Low. Papers from a symposium, Cambridge, Mass., Oct. 1981. Alan H. Guth, Kerson Huang, and Robert L. Jaffe, Eds. MIT Press, Cambridge, Mass., 1983. xxxvi, 262 pp., illus. $35.

Atlas of Airborne Fungal Spores in Europe. Siwert Nilsson, Ed. Springer-Verlag, New York, 1983. x, 140 pp. $50.

Autonomic Nerve Function in the Vertebrates. Stefan Nilsson. Springer-Verlag, New York, 1983. xiv, 254 pp., illus. $47.50. Zoophysiology, vol. 13.

Basic Ecology. Eugene P. Odum. Saunders, Philadelphia, 1983. x, 614 pp., illus. $30.95.

Basic Electronics for Scientists. James J. Brophy. McGraw-Hill, New York, ed. 4, 1983. x, 454 pp., illus. $34.95.

Basic Statistical Methods. N. M. Downie and R. W. Heath. Harper and Row, New York, ed. 5, 1983. viii, 372 pp. $24.50.

Behavior Disorders in Children. Harvey F. Clarizio and George F. McCoy. Harper and Row, New York, ed. 3, 1983. xii, 724 pp., illus. $26.95.

Biochemistry and Physiology of the Skin. Lowell A. Goldsmith, Ed. Oxford University Press, New York, 1983. Two volumes. xl, 1324 pp., illus. $53.

The Biology of Lampreys. M. W. Hardisty and I. C. Potter, Eds. Academic Press, New York, 1982. Vol. 3. xiv, 470 pp., illus. $89.50. Vol. 4A. xii, 306 pp., illus. $60. Vol. 4B. xii, 276 pp., illus. $53.

Birth Control Technologies. Prospects by the Year 2000. Michael J. K. Harper. University of Texas Press, Austin, 1983. x, 272 pp. $27.50.

Chemical Principles. Alternate Edition, with a Qualitative Analysis Supplement. William L. Masterton, Emil J. Slowinski, and Conrad L. Stanitski. Saunders, Philadelphia, 1983. xiv, 792 pp., illus., + appendixes. $31.95.

Chemical Principles in the Laboratory, with Qualitative Analysis. Alternate Edition. Emil J. Slowinski,

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