Vignettes: Molecular Pride

Molecular biologists may have done more to confound the meaning of homology than have any other group of scientists. . . . Why this confusion of terms has arisen in molecular biology is not clear; perhaps the term homology is thought to make the work sound more like science than would use of the simple and obvious word similarity.

—*David M. Hillis*, in *Homology: The Hierarchical Basis of Comparative Biology* (Brian K. Hall, Ed.; Academic Press)

Francis Crick proclaims that "The ultimate aim of the modern movement in biology is in fact to explain *all* biology in terms of physics and chemistry." Such a thoroughgoing reductionism is a kind of neo-mechanical view of reality, and since it is the "mechanical" problems which get solved first in the development of a science (clocks are easier to understand than clouds), it is scarcely surprising the biologists are tempted, in the first generation of their quantitative success, to espouse such opinions.

—*John Polkinghorne*, in *The Faith of a Physicist: Reflections of a Bottom-Up Thinker* (Princeton University Press)

ed by Kolbe and Liebig over the theoretical construction of organic chemistry) is that cognitive aspects can never be ignored or subsumed into social ones. Social factors, though not insignificant in the choice of chemical problems, especially in an industrial and commercial context, come into their own in the academic context when discoveries and opinions have to be "sold" to a peer group that governs the reward systems. As Rocke convincingly demonstrates, despite the value of sociological perspectives to historians, "the power and vitality of scientific ideas and logic, the constant regulating appeal to the empirical world, and the contingent influence of individuals ought not to be underestimated" (p. 112).

This eclectic approach to the historiography of chemistry, or of science generally, will make good sense to practicing historians and to reflective scientists. However, as William B. Jensen points out in a polemical essay on the publics for the history of chemistry, the vast majority of chemists care nothing for history and do not read books on their subject anyway. Might this state of affairs have less to do with something lacking in chemists' education than with the nature of chemical philosophy since the 1830s? As Mary Jo Nye suggests in her essay in the first part of the book, chemists, unlike physicists, have in seeking precision and rigor come to regard multitheoretical representations of the same phenomenon as perfectly acceptable. Though chemistry does not raise deep philosophical questions about the cosmos and the meaning of life (as, historically, astronomy, geology, and biology have done), there is nevertheless a metaphysical basis to modern chemistry rooted in its sheer complexity as a mature and empirically rich science.

Apart from a minority who, as Jensen remarks, are eager "to gain as much conceptual insight as possible into the nature of chemical phenomena" (p. 266), these qualities of the discipline mean that most chemists can operate successfully without a historical perspective. Personally, I feel bound to agree with Jensen that professional historians of chemistry (and of science) are as much to blame as practicing chemists for their failure to make the history of the chemical sciences seem interesting and relevant. *Chemistry and the Modern World* undoubtedly goes some way to bridge the gaps between chemists, historians, and their publics by demonstrating how the insights of historical research can help chemists themselves, policy-makers, and the general public understand policy issues involving the chemical sciences.

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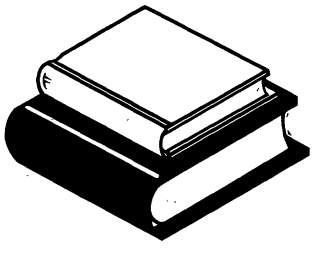

Red Sea Enigmas

Geologic Evolution of the Red Sea. ROBERT G. COLEMAN. Clarendon (Oxford University Press), New York, 1993. x, 186 pp., illus. $59.95 or £45. Oxford Monographs on Geology and Geophysics, 24.

Anyone looking at a map of the Red Sea can only be impressed by the remarkable parallelism of the Red Sea shores. A tracing of one coastline between 16°N and the Gulf of Suez fits perfectly on the other. The same is true for the Gulf of Aden. It is as if there were a clean fracture through the continental crust extending from the entrance of the Gulf of Aden through to the Gulf of Suez. This implies that the Red Sea has parted by nearly 400 kilometers at its widest, and yet we know this cannot be so, as the Danakil horst is in between and continental rocks have been found in boreholes in the north. The exact extent of oceanic crust underlying the Red Sea sediments and the reason for the remarkable parallelism of the coasts remain enigmas.

With the development of marine geophysics and surveying there has been considerable exploration of the Red Sea over the last few decades. Eighteen deeps have been discovered along the axis of the Red Sea, some of which have hot brines and heavy metal deposits including some silver and gold. The brines are enriched in lead, zinc, copper, iron, manganese, and aluminum derived from hydrothermal circulation of sea water with the underlying basalts, at temperatures sometimes exceeding 330°C. This remarkable discovery was followed by the equally remarkable discovery of the "black smokers" along the East Pacific Rise and Juan de Fuca spreading centers, where comparable heavy minerals have been found. These discoveries have led to a whole new field of mineralogy of spreading centers and are leading to a better understanding of ancient and modern mineral deposits. Unfortunately, exploitation of the heavy metals could be an environmental hazard, as the Red Sea is a finely tuned ecosystem with remarkably beautiful fauna and flora.

In contrast, the exploration for hydrocarbons has been less successful (apart from the Gulf of Suez). The Red Sea has large thicknesses of sediments along its margins that have received the attention of many oil companies. There have been 53 boreholes around the coasts and only two (undeveloped) hydrocarbon finds—in the most northeasterly part and in the Tokar delta off the Sudan coast at 18 to 19°N. Both finds were of gas and condensates. Having a spreading center, the Red Sea has high heat

flow with record highs along its axis and more than twice the world mean along its coasts. This may restrict the hydrocarbon potential to gas.

With all these exciting developments Coleman's book on the geology of the Red Sea is most timely. Although it is a slim volume (152 pages of text plus a very useful 21 pages of references), it contains a wealth of information ranging from geomorphology, stratigraphy, volcanic and sedimentary history, structure, and geophysics to plate tectonics and economic aspects. The subject treated in the most detail is the volcanic history, reflecting the author's interests. This chapter is a personal account of Coleman's experiences in the Red Sea. He repeatedly raises the vexing problem of the amount of oceanic crust. Unlike the Gulf of Aden, the Red Sea has huge thicknesses of evaporites, and it has been extraordinarily difficult to answer the question of what lies beneath them. After following the U.S. Geological Survey line postulating shore-to-shore oceanic crust at least in the southern Red Sea, Coleman in his epilogue says: "I now believe that the crust under the thick evaporite section consists of extended Precambrian crust invaded by tholeiitic intrusives." Like the biblical parting of the Red Sea, it remains a mystery.

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The Veiled Planet

Venus. The Geological Story. PETER CATTERMOLE. UCL Press, London, and Johns Hopkins University Press, Baltimore, MD, 1994. vi, 250 pp., illus., + plates. £25 or $49.95.

The recent success of the Magellan mission to Venus has resulted not only in a significant increase in the amount of available data on this planet but now in mountains of new research papers. With *Venus: The Geological Story* Peter Cattermole attempts to summarize the current state of our knowledge of the surface and interior of Venus. The book captures the essence of a dynamic planet that fascinates specialists and nonspecialists alike owing to its unique spectrum of volcanic and tectonic features and its fantastic geological activity to within at least the last several hundred million years.

The time is indeed ripe for a book on the geology of Venus, and Cattermole has, to use the words of Nathan Bedford Forrest, gotten there "first with the most men." However, the forced march of a quick writing (many of the references are to material published in October 1992 and the preface is dated March 1993) has resulted in an uneven product. The author remarks that the book represents his attempt "to abstract, from a wealth of data, the bare bones of the geology of Venus, almost as it is being written." Indeed, he may not have had time to construct any real synthesis. In 1992, 48 original research papers reporting on Magellan observations were published in two weighty issues of the *Journal of Geophysical Research*. Cattermole's detailed summaries of many of these papers form the bulk of the book. Unfortunately, an absence of continuity between these essays has left the material in a state of disorganization. For example, the most detailed discussion of highland formation occurs in the context of an analysis of one paper about one highland. The organizational problems are especially evident in the presentation of related material, either illustrations or text, from different research papers with no critical analysis of the distinctions between them. In general, the material is not well integrated, with pre-Magellan research not placed in its appropriate post-Magellan context.

Left, the western hemisphere of Venus; centered on the area known as Beta Regio. Magellan MRPS 42303. *Right*, a perspective view of Maat Mons, a 5-kilometer-high volcano with a summit caldera complex. "This view, looking south, shows radar-bright volcanic flows extending northwards and embaying ejecta from a 23 km diameter impact crater." Magellan image P-40175. [From *Venus*]

The book gives a balanced overview of impact cratering, surficial processes, volcanism, and tectonism. The material on tectonism is distributed throughout three separate, nonadjacent chapters. Terminology is sometimes confusing: For example, Magellan established that Venus has no globally interconnected tectonic network, which is a signature of plate tectonics. Cattermole recognizes this absence of a network, yet repeatedly refers to Venus's tectonic patterns as "global-scale." The description of the planet's physiography is excessive; much of the information could be obtained simply by looking at a map. In addition, the text reveals some significant misconceptions concerning gravity, isostasy, and heat loss and contains an above-average number of misquotations and minor errors. This is definitely a book to read with pencil in hand.

Despite these flaws, *Venus: The Geological Story* will meet the needs of the nonspecialist seeking a single-volume introduction to the subject. Containing good geological background material and up to date through 1992, it fills the gap between the research journals and more popular, coffee-table books. As in any active scientific field, in Venusian geology it is difficult to pick a stopping point and say, "This is it." This book provides a convenient first stop. It is unfortunate that more recent findings such as the implications of Magellan's gravity data for the interior structure of the planet did not make it into the book. With NASA's apparent early cancellation of Venus-specific data analysis programs, such work may slow, and it is unclear when, in Cattermole's words, "a more complete picture of Venusian geology will . . . emerge."

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Language and Interaction

The Transition from Infancy to Language. Acquiring the Power of Expression. LOIS BLOOM. Cambridge University Press, New York, 1993. xiv, 350 pp., illus. $44.95 or £35.

Regardless of their theoretical persuasions, researchers in language acquisition today recognize (at least in passing) that both nature and nurture are necessary to the child's achievement of language. Most, however, continue to construe those terms in traditional ways that perpetuate an "ei-