

BOOK REVIEW

Biom mineralization, edited by Patricia M. Dove, James J. De Yoreo and Steve Weiner. *Reviews in Mineralogy and Geochemistry*, **54**, 2003, xiii + 381 pp. [ISBN 0-939950-66-9]. Price \$36 (\$27 for CMS, MSA and GS members).

With the publication of *Biom mineralization*, Volume 54 of the acclaimed *Reviews in Mineralogy and Geochemistry* series, the Mineralogical Society of America and the Geochemical Society continue their up-to-the-minute chronicling of the on-going collaboration between Earth and life sciences. Comprising review papers submitted following a two-day short course in December 2003 in Napa, California, the book presents the state of the inherently interdisciplinary science aimed at understanding the processes whereby organisms form minerals and the geological and evolutionary implications of these phenomena.

An overview chapter begins the book and the editors use this opportunity to delineate the large themes of the volume, differentiate between biologically controlled and induced mineralization and deliver a stern warning to investigators concerning the Vital Effect. Two introductory background chapters follow, one on molecular biology and biomacromolecular principles and one concerning crystal chemistry. The highly readable former chapter strikes exactly the right tone and length for a review volume aimed primarily at Earth scientists, and is complemented well by a detailed examination of crystal nucleation and growth. Taken as a whole, the first three chapters serve to equip the reader for the coming plunge into the living interface between biology and mineralogy.

A fascinating blend of basic and molecular biology, geochemistry, and mineralogy comprises the bulk of the book, allowing the authors to explore the mechanisms whereby organisms fashion inorganic components into oxides, phosphates and carbonates, as well as the global geochemical consequences of these activities. To tell a tale that spans from ions to planetary processes is no mean feat and yet this book manages to do just that. The best chapters open with highly readable synopses of the basic biology of the organism under consideration and readers may find this knowledge useful grounding when the later details threaten to overwhelm.

Prokaryotes are accorded two separate chapters, one for biologically induced and one for biologically controlled mineralization. The theme of global geo-

chemical consequences of biom mineralization is perhaps best developed in the chapters on corals and foraminifers, and the intricate molecular struggle of these organisms to fashion carbonates in a hostile geochemical environment illustrates the allure of this area of research.

I confess I always regarded diatoms as the apotheosis of microarchitecture, but the scanning electron micrographs illustrating the chapter on coccoliths offer striking evidence that these tiny algae are the Frank Lloyd Wrights of the microworld. One of these lovely micrographs also graces the cover of the volume and one can think of no better way to convey quickly the wonder and excitement of biom mineralization than to peruse this chapter. Chapters on silicification and mineralization within organic frameworks complete what I have come to think of as the example portion of the book.

Two final chapters follow and examine the evolutionary history of biom mineralization and reinforce its global geochemical consequences.

The best review volumes not only offer a perspective of the current state of inquiry, but a roadmap of how we came to this point and a glimpse of the road ahead. This book excels at the first two aims and suggestions for further research are left largely to the reader to discern. With the exception of the summary section of the chapter on biom mineralization within vesicles, and a sense of the excitement of coming discoveries well conveyed by the "This is just the beginning" comment concluding the chapter on foraminifera, such ringing and engaging calls to arms are largely absent. And while I am on the subject of omissions, a chapter on bioengineering and molecular control of nanocrystalline synthesis would have been a nice way to demonstrate the applied potential of biom mineralization. Perhaps that topic will form the basis for a future *Reviews* volume.

On the whole, these small criticisms take nothing away from this essential book. For years to come, it will find a well used and oft-visited spot on the bookshelves of interdisciplinary scientists working in the field.

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