

# BIOMINERALIZATION

54

*Reviews in Mineralogy and Geochemistry*

54

## FOREWORD

In this volume, the editors Patricia Dove, James De Yoreo, and Steve Weiner have integrated a diverse group of contributors from the earth, biological and materials disciplines who introduce us to the concepts of biological mineralization, examine the major biomineralization processes, and describe their impact on earth history. This volume offers an excellent opportunity for both specialists and non-specialists to understand the basic principles of biomineralization. It also gives us a view into the future of this growing field of research. It was prepared in advance of a two-day short course (December 6–7, 2003) on Biomineralization, jointly sponsored by GS and MSA, and held at the Silverado Resort and Conference Center in Napa Valley, California prior to the fall AGU meeting in San Francisco.

Trish deserves a long vacation after the supreme effort she put into assembling this volume (and *on time* for the short course!). The many hours she spent reviewing, editing, revising, as well as her ability to keep things on-track made this volume possible. Steve's reviews also significantly improved many of the chapters. The authors are commended for their hard work. Thank you. And, as always, I thank my infinitely patient and supportive family, Kevin, Ethan and Natalie.

*Jodi J. Rosso*, Series Editor  
*West Richland, Washington*  
October 25, 2003

## PREFACE AND ACKNOWLEDGMENTS

Since the dawn of life on earth, organisms have played roles in mineral formation in processes broadly known as biomineralization. This biologically-mediated organization of aqueous ions into amorphous and crystalline materials results in materials that are as simple as adventitious precipitates or as complex as exquisitely fabricated structures that meet specialized functionalities. The purpose of this volume of *Reviews in Mineralogy and Geochemistry* is to provide students and professionals in the earth sciences with a review that focuses upon the various processes by which organisms direct the formation of minerals. Our framework of examining biominerals from the viewpoints of major mineralization strategies distinguishes this volume from most previous reviews. The review begins by introducing the reader to over-arching principles that are needed to investigate biomineralization phenomena and shows the current state of knowledge regarding the major approaches to mineralization that organisms have developed over the course of Earth history. By exploring the complexities that underlie the “synthesis” of biogenic materials, and therefore the basis for how compositions and structures of biominerals are mediated (or not), we believe this volume will be instrumental in propelling studies of biomineralization to a new level of research questions that are grounded in an understanding of the underlying biological phenomena. To make this happen, the volume contains contributions from a special group of authors whose areas of expertise are as varied as the biominerals themselves. Special thanks are due to these scientists for meeting the deadlines with their comprehensive contributions.

## *Foreword, Preface & Acknowledgments*

We also thank the individuals and organizations who have made possible the timely publication of this review. The Series editor, Jodi Rosso, cheerfully handled the production of the volume through our tight publication schedule. Alex Speer was helpful throughout the process and we thank him for sharing his experience regarding how to ensure a successful review and short course. Many other people have contributed to seeing the success of this volume and we thank Drs. Selim Elhadj, Nizhou Han, and Laura Wasylenki for carefully proofreading several chapters and helping with the many reference searches. Ellen Mathena and David Rugh helped to collect materials and to work with draft manuscripts. PMD also thanks the Department of Energy, Division of Chemical Sciences, Geosciences and Biosciences (DE-FG02-00ER15112) and the National Science Foundation (NSF-OCE-0083173) for supporting her time on this project.

We are very grateful to the U.S. Department of Energy, Office of Basic Energy Sciences, Chemical Sciences, Geosciences and Biosciences Division, for special funding in honor of Bill Luth (see dedication). We especially thank Dr. Nick Woodward for making this support possible. Additional funding was also provided by Lawrence Livermore National Laboratory. We also thank the College of Science and the Department of Geosciences at Virginia Tech for providing supplementary funds that allowed us to award registration fee waivers to 20 of the student participants. While we are all students of this fascinating field, it is a delight to see the high level of interest in the next generation of scientists.

*Patricia M. Dove*  
*Steve Weiner*  
*James J. De Yoreo*

Blacksburg, Virginia  
September 2003