
Preface

Several important advances have occurred in the field of geomicrobiology since the last edition of this book, including a number of observations made possible by the introduction of genetic and molecular biological techniques that make revision and updating of the previous edition of *Geomicrobiology* timely.

Henry Lutz Ehrlich, author of the earlier four editions, has been joined by Dianne K. Newman for this fifth edition to lend her expertise in the area of molecular geomicrobiology. This has resulted in a new chapter (Chapter 8) in this edition, which is entitled "Molecular Methods in Geomicrobiology." The techniques described in this chapter illuminate the processes by which bacteria catalyze important geomicrobial reactions. For example, we are beginning to understand the molecular details whereby some gram-negative bacteria export electrons to mineral oxides with which they are in physical contact in their respiratory metabolism. Such electron transfer is enabled by respiratory enzymes in the outer membrane and periplasm of such organisms. Molecular techniques have also demonstrated that at least one gram-negative bacterium can import electrons donated by an electron donor, ferrous iron, in contact with the outer surface of the outer membrane of this organism. In some cases, electron shuttles have been shown to facilitate electron transfer. Further important advances in this area are anticipated. Collectively, these mechanistic observations make clear that microbes play a much more direct role in the transformation of oxidizable and reducible minerals than had been previously believed by many researchers in this field. We anticipate that as mechanistic molecular approaches are increasingly applied to diverse problems in geomicrobiology, exciting discoveries will be made about how life sustains itself even in seemingly inhospitable environments such as the deep subsurface.

Just as in the case of the previous editions of *Geomicrobiology*, the chief aim of the fifth edition is to serve as an introduction to the subject and an up-to-date reference. To continue to provide a broad perspective of the development of the field, discussion of the older literature that appeared in earlier editions of this book has been retained. Changes in understanding and viewpoints are pointed out where necessary. Although we do not claim that the reference citations at the end of each chapter are exhaustive, cross-referencing should reveal other pertinent literature. As before, a glossary of terms that may be unfamiliar to some readers has been added. All chapters have been updated where necessary by introducing the findings of recent research.

We are continuing to retain some of the drawings prepared by Stephen Chiang for the first edition. Other illustrations from the fourth edition have been retained in the current edition, with appropriate acknowledgments to their source when not originating from us, and some new illustrations have been added. We are very grateful to Andreas Kappler for allowing us to use the photomicrograph of *Chlorobium ferrooxidans* for the book cover illustration of this edition.

We owe special thanks to Martin Polz, Victoria Orphan, and Alex Sessions for stimulating discussions that shaped the content of Chapter 8; and we gratefully acknowledge Alexandre Poulain for his help in preparing the figures for this chapter. We also owe sincere thanks to Jon Price for his assistance in obtaining the photograph of the sample of basalt from the rock collection at Rensselaer Polytechnic Institute.

We appreciate the encouragement and editorial assistance of Judith Spiegel, Barbara Norwitz, and Patricia Roberson of Taylor & Francis Group LLC.

Responsibility for the presentation and interpretation of the subject matter in this edition rests entirely with the authors.

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