

CONTENTS

Contributors

vii

1. Geomicrobiology and Metagenomics of Terrestrial Deep Subsurface Microbiomes

1

M. Itävaara, H. Salavirta, K. Marjamaa and T. Ruskeeniemi

1. Introduction—Deep Crustal Life	3
2. Exploring the Diversity of Terrestrial Deep Subsurface Microbiomes	20
3. Sampling of the Deep Biosphere	23
4. Terrestrial Deep Subsurface Microbiomes: Metagenomics	30
5. A Case Study: Metagenomics of the Outokumpu Deep Borehole	39
6. Conclusions	61
References	63

2. Microbially-induced Carbonate Precipitation for Immobilization of Toxic Metals

79

Deepika Kumari, Xin-Yi Qian, Xiangliang Pan, Varenym Achal, Qianwei Li and Geoffrey Michael Gadd

1. Introduction	80
2. Urease	82
3. Biomineralization	83
4. Bioprecipitation of Metal(loid)s by Bacterial-Induced Carbonate Precipitation	87
5. Bioprecipitation of Metals by Fungal-Induced Carbonate Precipitation	97
6. Conclusions	100
Acknowledgments	101
References	101

3. Bacterial Mobilization of Nutrients From Biochar-Amended Soils

109

A. Schmalenberger and A. Fox

1. Introduction	110
2. Biochar and the Soil Microbiota	112
3. Biochar as a Source of Nutrients	116
4. Biochar and the Bacterial Cycling of Nitrogen	117
5. Biochar and the Bacterial Cycling of Phosphorus	132

6. Biochar and the Bacterial Cycling of Sulfur	139
7. Biochar and Bacterial Cycling of Other Nutrients	143
8. Conclusions and Outlook	144
Acknowledgments	145
References	146

Index	161
--------------	------------

Contents of Previous Volumes	167
-------------------------------------	------------