Recognition of the biological nature of sulphate reduction in natural environments, and identification of the bacterial species involved dates to the latter part of the nineteenth century, and the seminal work of such giants of the early days of microbiology as Beijerinck and Winogradsky. The central role of environmental studies in highlighting the issues to be addressed and the problems to be solved, has remained to this day a constant theme in microbiological analyses of the sulphate reducers.

The modern era of such analyses, however, can be said to date from the period around 1960 when the demonstrations by Postgate and Peck, respectively, of the presence of cytochromes and of phosphorylation linked to anaerobic respiration in sulphate-reducing bacteria (SRB), fundamentally altered our view of the biochemical nature of these organisms and, in particular, of their mechanisms of energy conservation.

There then followed a period of intense activity centred on: elucidation of the metabolic pathways of substrate utilisation and the mechanisms of energy generation; cultural techniques and the identification of an ever-increasing number of new species; and the appreciation of their significant role in maintaining, or disrupting, the biological balance of many natural and man-made ecosystems.

These themes of biochemistry and cell physiology, phylogeny, and ecology remain central to the understanding of SRB themselves, and of their interactions with other components of the biosphere. In recent years, however, their study has undergone a further paradigm shift with the introduction of the many powerful experimental techniques and analytical approaches of molecular biology. As a direct consequence of these developments, sulphate-reducing prokaryotes (bacteria and archaea, as we have come to appreciate) are now the chosen organisms of study in many of the
major microbiological laboratories worldwide. Additionally, there is an extensive literature covering their several unique characteristics which, in many cases, may help to shed light on certain issues of fundamental importance to our understanding of the evolution and development of life processes. It is the purpose of this book, therefore, to draw together many of the major players in the field of biological sulphate reduction, and to present a clear and full picture of the current state of our knowledge. We thank our authors who have accepted this challenge, and given so willingly of their time, effort and insight.

It has been a conscious decision to include in the same volume studies of: genomic and proteomic analyses; phylogenetic diversity; molecular characterisation of enzymes and respiratory systems; thermodynamic analyses of metabolic processes, including anaerobic oxidation of hydrocarbons; response to stress, most particularly with regard to oxygen and other alternative electron acceptors; extreme and specialised (micro)environments, including biofilms; environmental impact in, for example, bioremediation and corrosion; and medical microbiology. These apparently disparate subject areas nevertheless form an intellectual continuum, within which it is possible to see the interdependence of the techniques and thought processes of one study area impacting directly on another. Perhaps uniquely, our current knowledge of the SRB is sufficiently extensive for us to be able to recognise and make practical use of this cross-fertilisation, and yet not so extensive and subject to technique-dependency that scientists working in one field have neither knowledge of, nor empathy with, the work in other areas. Thus it may be that this book will be seen in later years to stand at the crossroads before any such parting of the ways, as research into the sulphate-reducers continues at its present exhilarating pace. We would hope so.

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