

Preface

"If there is magic on this planet, it is contained in water." (Loran Eiseley, *The Immense Journey*, 1957)

Diatoms are being used increasingly in a wide range of applications, and the number of diatomists and their publications continues to increase rapidly. Although several books have dealt with various aspects of diatom biology, ecology, and taxonomy, the first edition of this volume, published over a decade ago, was the first to summarize the many applications and uses of diatoms. However, many new and exciting papers have been published in the intervening years. This, coupled with the fact that research on environmental and earth science applications of diatoms has continued at a frenetic pace, prompted us to undertake a major revision of our first edition.

Our overall goal was to collate a series of review chapters that would cover most of the key applications and uses of diatoms in the environmental and earth sciences. Due to space limitations, we could not include all types of applications, but we hope to have covered the main ones. Moreover, many of the chapters could easily have been double in size, and in fact several chapters could have been expanded to the size of books. Nonetheless, we hope material has been reviewed in sufficient breadth and detail to make this a valuable reference book for a wide spectrum of scientists, managers, and other users. In addition, we hope that researchers who occasionally use diatoms in their work, or at least read about how diatoms are being used by their colleagues (e.g., archeologists, forensic scientists, climatologists, engineers, etc.), will also find the book useful.

Compared to our 1999 volume, the current edition is significantly expanded and revised. It includes 16 new chapters, and an extensive revision and expansion of the original chapters, including the addition of many new co-authors.

The volume is broadly divided into six parts. Following our brief prologue, there is an introduction to the biology of diatoms and a chapter on numerical approaches commonly

used by diatomists. Part II contains eight chapters that review how diatoms can be used as indicators of environmental change in flowing waters and lakes. Part III summarizes work completed on diatoms from cold and extreme environments, such as subarctic and alpine regions, Antarctica and the High Arctic. These ecosystems are often considered to be especially sensitive bellwethers of environmental change. Part IV contains nine chapters dealing with diatoms in marine and estuarine environments. The final part (Part V) summarizes most other applications (e.g., using diatoms as indicators in sub-aerial, wetland and peatland environments, and other applications such as tracking past wildlife populations, archeology, oil exploration and correlation, forensic studies, toxic effects, atmospheric transport, invasive species, diatomites, isotopes, and nanotechnology). We conclude with a short epilogue (Part VI), followed by a much expanded glossary (including acronyms and abbreviations) and an index.

Many individuals have helped with the preparation of this volume. We are especially grateful to Martin Griffiths (Cambridge University Press), who shepherded this project throughout much of its development. As always, the reviewers provided excellent suggestions for improving the chapters. We are also grateful to our colleagues at Queen's University and the University of Michigan, and elsewhere, who helped in many ways to bring this volume to its completion. And, of course, we thank the authors.

These are exciting times for diatom-based research. We hope that the following chapters effectively summarize how these powerful approaches can be used by a diverse group of users.

John P. Smol
Kingston, Ontario, Canada
Eugene F. Stoermer
Ann Arbor, Michigan, USA