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POND SCUM TO CARBON SINK

Geological and Environmental Applications of the Diatoms

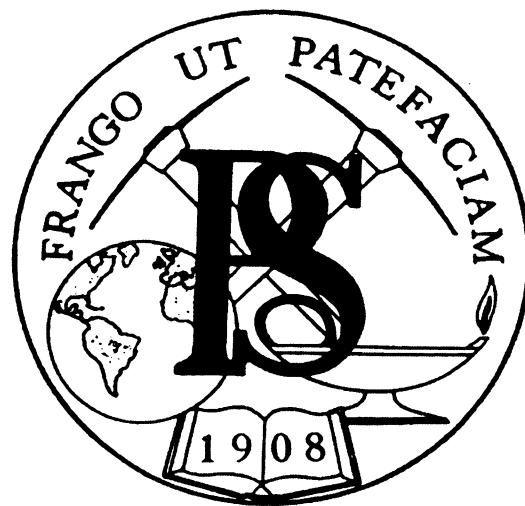
Scott W. Starratt, Editor

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POND SCUM TO CARBON SINK
Geological and Environmental
Applications of the Diatoms

Presented as a Paleontological Society Short Course
at the
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October 27, 2007

Convened by

Scott W. Starratt
U.S. Geological Survey

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DEDICATION

This volume is dedicated to John Platt Bradbury (1936-2005), former geologist with the U.S. Geological Survey, whose understanding of diatom ecology and taxonomy, paleolimnology, and Earth history enriched the lives of students and colleagues too numerous to mention.

“If you use diatoms as a proxy and do not understand what makes them happy or sad or how they behave, you are apt to waste your and other people’s time counting them.”
— J. P. B., 2003



J. Platt Bradbury and Vera Markgraf at home in southern Colorado, June 2005.

AN INTRODUCTION TO THE DIATOMS

Scott W. Starratt, Editor
U.S. Geological Survey

Diatoms (Class Bacillariophyceae) are a group of microscopic algae that are abundant in almost all aquatic environments, as well as other moist terrestrial sites with sufficient light. They have even been found on ice-coated guy wires in the Arctic. Estimates of the number of diatom species, both extant and fossil, vary widely. Conservative estimates indicate the number that have been properly described is around 24,000 and that the total number of species may be as high as 200,000 (Julius, this volume). Over the past couple of decades, the combination of increased taxonomic and environmental information has led to a rapid increase in our knowledge of both modern and past limnological systems. Molecular techniques are now being used to expand on morphologically based phylogenies.

Traditionally, diatomists have been separated into those who study the physiology, ecology, and morphology of diatoms, and those who apply that knowledge to the fossil record. There is increasing recognition of the need to bring these two areas together in a coherent way, as interdisciplinary approaches are becoming more widely used in environmental and paleoenvironmental research. It is, therefore, important for current researchers and students to become aware of the wide range of applications for which diatoms can be used.

The goal of this short course is to gather a group of speakers to discuss the key applications and uses of diatoms in the environmental and earth sciences. For various reasons it was not possible to include all types of applications, but we hope to have covered the main ones. We hope that the material is of interest to a wide range of scientists and to those outside the field, who occasionally use diatoms in their work or read about how they are being applied by others.

The papers in this volume have benefited from reviews by John Barron (U.S. Geological Survey), Roger Byrne (University of California, Berkeley), B. Lynn Ingram (University of California, Berkeley), Jere Lipps (University of California, Berkeley), Mary McGann (U.S. Geological Survey), Elmira Wan (U.S. Geological Survey), and other anonymous reviewers. I also wish to acknowledge the generous support of the Paleontological Society, the U.S. Geological Survey, and the Geological Society of America for sponsoring this short course. I would also like to thank Rowan Lockwood, Paleontological Society Program Coordinator and Susan Butts, Special Publications Editor.

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Applications of the Diatoms

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