

CRC REVIVALS

Biomarkers

Biochemical, Physiological, and
Histological Markers of
Anthropogenic Stress

Edited by

**Robert J. Huggett, Richard A.
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L Bergman**



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Robert J. Huggett, Virginia Institute of Marine Science

Richard A. Kimerle, Monsanto Company

Paul M. Mehrle, Jr., ABC Laboratories

Harold L. Bergman, University of Wyoming

Proceedings of the Eighth Pellston Workshop

Keystone, Colorado, July 23-28, 1989

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The SETAC Special Publication Series

The SETAC Special Publications series was established by the Society of Environmental Toxicology and Chemistry to provide in-depth reviews and critical appraisals on scientific subjects relevant to understanding the impacts of chemicals and technology on the environment. The series consists of single- and multiple-authored/edited books on topics selected by the SETAC Board of Directors for their importance, timeliness, and their contribution to multidisciplinary approaches to solving environmental problems. The diversity and breadth of subjects covered in the series will reflect the wide range of disciplines encompassed by environmental toxicology, environmental chemistry, and hazard/risk assessment. Despite this diversity, the goals of these volumes are similar; they are to present the reader with authoritative coverage of the literature, as well as paradigms, methodologies, controversies, research needs, and new development specific to the featured topics. All books in the series are peer reviewed for SETAC by acknowledged experts.

The SETAC Special Publications will be useful to environmental scientists in research, research management, chemical manufacturing, regulation, and education, as well as to students considering careers in these areas. The series will provide information for keeping abreast of recent developments in familiar areas and for rapid introduction to principles and approaches in new subject areas.

Biomarkers: Biochemical, Physiological, and Histological Markers of Anthropogenic Stress, is the sixth volume to be published in this series. It presents the proceedings of the Biomarkers Workshop, the eighth Pellston Workshop, held July 23–28, 1989, in Keystone, Colorado. The workshop was organized to bring selected professionals together to discuss the use of biomarkers for use in assessing exposure and effect of toxicants. This volume presents critical analyses of using biochemical, physiological, and histological changes to estimate exposure of organisms to toxicants or resultant effects of exposure to toxicants. It represents a large body of pioneering work and is a significant contribution.

Thomas W. LaPoint
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Preface

This publication is the result of the eighth Pellston Workshop, the last four of which were sponsored by the Society of Environmental Toxicology and Chemistry (SETAC). The focus is on biomarkers and their present and future utility to determine either exposure to or effects of anthropogenic stress. Each chapter is based on discussion papers generated before and during a workshop held in Keystone, Colorado in July 1989. Each chapter was peer reviewed by at least two experts in that particular field.

The reader may find several topics discussed in various chapters. Because the subject matter itself has no sharp boundaries, it was necessary to include many overlapping topics for the integrity of the chapters.



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Robert J. Huggett is professor of Marine Science at the Virginia Institute of Marine Science, the School of Marine Science of The College of William and Mary.

Dr. Huggett received his MS degree from the Scripps Institution of Oceanography, The University of California, San Diego and his PhD from The College of William and Mary specializing in Marine Chemistry.

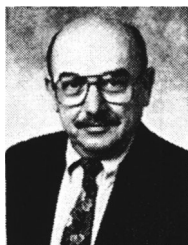
He has authored or co-authored over 70 research articles on subjects ranging from the fate and transport of trace metals and anthropogenic organic substances to environmental risk assessments. He is a member of the Society of Environmental Toxicology and Chemistry (SETAC) and was a Board member from 1988–1990. He is presently a member of the Environmental Protection Agency's Science Advisory Board serving on the Environmental Processes and Effects Committee and the Executive Committee.



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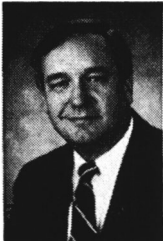
Dr. Richard Kimerle is a Senior Environmental Science Fellow with the Monsanto Company in St. Louis, Missouri. His academic training at the University of Missouri and Oregon State University is in aquatic ecology and water pollution biology. His industrial experience of over 24 years includes chemical safety testing and ecological risk assessment of products, effluents, and hazardous waste sites. He is an active member in the Society of Environmental Toxicology and Chemistry (SETAC) and the EPA's Science Advisory Board.



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Dr. Paul Mehrle, Jr. is Vice President, Business and Program Development, for ABC Laboratories, Inc., Columbia, Missouri. Prior to joining ABC Laboratories in 1990, he was with the research and development program of the U.S. Department of Interior, Fish and Wildlife Service, for 20 years. He directed the laboratory and field toxicology research programs at the Service's National Fisheries Contaminant Research Center in Columbia, Missouri.

Dr. Mehrle received his undergraduate degree in biology from Southwestern at Memphis (Rhodes College), Memphis, Tennessee, in 1967. He earned his MS in zoology in 1969 and PhD in biochemistry in 1971 from the University of Missouri.

Dr. Mehrle has directed extensive research programs in environmental toxicology during his career. His research has focused on the biochemical mechanisms of chemical contaminants in aquatic organisms and development of biomarkers for use in hazard assessments. Dr. Mehrle has published over 60 scientific papers.

Dr. Mehrle is a member of the Society of Environmental Toxicology and Chemistry (SETAC), and is currently serving on the society's Board of Directors. He was elected Secretary/Treasurer of SETAC, and appointed Editor of *Environmental Toxicology and Chemistry*. He is a member of American Society for Testing and Materials (ASTM), American Chemical Society, American Fisheries Society, and Sigma Xi. He has served on numerous editorial boards of scientific journals and provided advisory services and scientific consultations to government agencies and private industries.



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