Summary

Each year ASTM Committee E-47 on Biological Effects and Environmental Fate sponsors a symposium on aquatic toxicology. The 1983 symposium was held in Milwaukee, Wisconsin, where a variety of excellent papers were presented on the following subjects: National Water Quality Criteria; Laboratory versus Field: Bridging the Gap; Biological and Ecological Implications of Responses of Organisms to Materials; Sublethal Effects; New and Innovative Methods and Concepts for Aquatic Testing and Hazard Evaluation; and Bioavailability and Recent Advances in Environmental Chemistry. A poster session covering a wide variety of topics also took place. For reader convenience, the papers in this volume were reorganized into five general areas.

The overall objective of the symposium was to promote discussion of approaches for estimating or determining the impact of pollution on aquatic ecosystems. This is accomplished through toxicological and chemical fate assessments. The field is still young, and we lack many tools needed for complete assessments. In addition, we need a more complete understanding of the principles of ecosystem functions, and how chemical effects therein are translated chemically and biologically. The papers comprising this publication address these needs.

One of the biggest deficiencies in the area of aquatic toxicology is the unavailability of useful, proven test methods. During this symposium, many new, modified, or old methods were evaluated or presented. Tests for evaluating sediment and sludge toxicity were proposed and assessed. A test method for evaluating chemical effects on atherinid fishes was proposed. Factors important for culturing and testing the crustacean *Ceriodaphnia* and the clam *Corbicula* were presented. Such data are invaluable for developing and refining methods as well as interpreting results. A new test using the pitcher-plant mosquito, *Wyeomyia smithii*, was presented; another test used filamentous algae as biomonitors of metal pollution. One paper examined chemical effects at the molecular genetics level using cyanophages associated with blue-green algae as models.

Single-species tests have been the norm for years and remain so, but multispecies or microcosm tests are being developed and there appears to be new interest in the use of biochemical indices of chemical effects. At one end of the spectrum of new tests, one group of researchers evaluated the use and effect

of small fish predation on community structure in a microcosm test system. At the other end of this spectrum, a scientist reviewed the state of the science of biochemical indices of pollution effects. Another group developed a procedure for measuring the assimilative capacity of organisms exposed to toxicants by measuring the concentrations of conjugating enzyme systems.

An important aspect concerning the utility of test results concerns statistics. This aspect was covered by many authors as part of their research. One paper concentrated on statistical design for toxicity screening procedures.

The aim of aquatic toxicology and chemistry is, of course, to evaluate the impact of pollutants on natural ecosystems. Papers were presented on effects of polluted sediment in Puget Sound, Washington, of sewage sludge, of di-*n*-hexylphthalate, of linear benzene sulfonate, of iron and zinc, and of arsenic on sediment microbial activity. Not only do these papers evaluate effects, they also evaluate the various procedures used to develop data on effects.

Toxic chemicals can be present in two different environments at the same concentrations and can elicit adverse effects in one environment and not another. The extent of toxicity in the field depends on bioavailability, the extent to which a chemical exists in a form or phase that can be taken up and exert toxicity in an organism. Several papers addressed the bioavailability of a variety of chemically contaminated sediments. These papers help our understanding of this area of considerable uncertainty and concern. One author included sediment and other factors in her paper on the bioavailability of copper. The thrust of these papers was, on the one hand, that certain types of chemicals can become unavailable, and, on the other, that they can be changed in form and become more toxic. This was shown to be the case for non-biologically available iron cyanide, which was converted microbially to toxic cyanides.

General methods of understanding ecological problems and management were covered in many papers. Some authors concentrated solely on these aspects. The importance of integrating exposure, uptake, and effects is addressed in one paper, while another uses a model to estimate effects of waste disposal in coastal waters. The problems of extrapolating data from the laboratory to the field (i.e., natural aquatic communities) were also discussed and reviewed.

Most toxicological assessments are closely tied to national pollution regulations. Because of regulatory needs, important concepts in aquatic toxicology and chemistry are used by governmental agencies in their rule-making; these rules in turn influence scientists and researchers. National water quality criteria constitute one such regulatory vehicle pushing the sciences. These criteria were discussed in a special forum at the symposium. Papers appearing in this volume discuss the degree to which the data used to set water quality criteria are representative; how much data are really needed to establish sound criteria; the ecological meaning of exceeding a given criterion; the role of plant toxicity in setting criteria; whether the criteria are sound; how to tie criteria to

variability in effluent concentrations, receiving water flows, etc.; and site-specific criteria.

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