Limnol. Oceanogr., 45(5), 2000, 1212

CHORUS, I., AND J. BARTRAM [EDS.] 1999. **Toxic cyanobacteria in water. A guide to their public health consequences, monitoring, and management.** E & FN Spon. xv + 416 p. £24.99. ISBN 0-419-23930-8.

Many algae can form blooms, and 200 or more of these produce secondary metabolites that are hazardous to wildlife and humans. In freshwater these harmful algal blooms often result from the proliferation of an extraordinary group of prokaryotic organisms that display eukaryotic physiological properties: the cyanobacteria (bluegreen algae). Although cyanobacteria formed blooms long before man appeared on the scene (McGovan et al. 1999; Bianchi et al. 2000), expanding human activities have stimulated their growth, and cyanobacterial blooms are now very common, especially in lakes and reservoirs.

Toxins produced by cyanobacteria (cyanotoxins) have both acute and chronic effects, and their intake through drinking water may be significant to human health (Falconer 1993). This, along with an increasing general demand for clean water, has generated an urgent need for tools to manage cyanobacterial blooms. The World Health Organization issued this book to address this need. It documents the impact of cyanobacteria on health, describes how to protect water resources from cyanobacteria, and how to design programs to assess the bloom status of water bodies.

The first part of the book is an overview of cyanobacterial systematics, their occurrence in nature, and the factors that influence bloom formation, particularly of planktonic species in freshwaters. This is followed by comprehensive reviews of presently known cyanotoxins (chemical structures, distribution in species and in natural environments, production, toxicology, and health impacts). Detrimental effects on aquatic biota are treated briefly, but the focus is clearly on human and domestic animals. Information on the toxicology of each group of toxins is nicely summarized, making it easy to look up information, although the many technical terms will be difficult for nonspecialists. As in any multiauthored book, there is some repetition of information (e.g., between chapters 3, cyanobacterial toxins, and 4, safe levels and safe practice.)

Defining precise safe levels and practices must await more comprehensive studies of the toxicology of cyanotoxins. Nevertheless, the authors risk giving what we believe to be useful guidelines based on available information. The guideline for recreational waters is particularly welcome as it gives an operational basis for dealing with cyanobacterial blooms, although it is clear that the authors, as most others, find this issue troublesome. Cultural eutrophication and ways to reduce nutrient loads are discussed, taking the book beyond cyanobacterial problems alone.

The last part of the book deals with monitoring and other technical aspects. Designing a sampling strategy is not straightforward because there are as many ways to do it as there are field scientists, and there is clearly no single ''true'' way. Even so, the chapter on field work (chapter 11) lacks substance and precision. Rigid guidelines are not appropriate, especially for people who must conform to specific national or international guidelines. Nowhere in this chapter are benthic cyanobacteria mentioned, but they may be important, as there have been several incidents of poisoning from benthic cyanobacteria (*see chapter 2*). The brief treatments of identification and enumeration of cyanobacteria and analytical chemical methods cover the most important aspects of these important topics.

The book is packed with useful information and provides an excellent review of the present state of knowledge. The frequent use of text boxes to describe case histories makes it easy to read, and the many well-structured tables are very useful summaries that make it easy to find information quickly. Anyone involved in management of waters afflicted with cyanobacterial blooms will find this book indispensable.

There are, however, weaknesses. Being a handbook, it necessarily takes a very broad perspective, and some aspects are treated rather briefly (e.g., biodegradation and accumulation in organisms). Further, it is impossible to include all—and sometimes contradictory—details, because many subjects are under development (e.g., analytic methods). The description of management tools that contains assessment and decision-making models with special emphasis on drinking water supplies is too long and could have benefitted from more editing. More disturbing are statements like ''Most *Microcystis* blooms are found in lakes with an average summer chlorophyll *a* concentration of 20–50 μg L^{-1}'' (p. 31); this is misleading if not qualified in relation to deep versus shallow waters or temperate versus tropical regions. We also disagree with some generalizations in chapter 11 about how cyanobacteria respond to stratification and light. Finally, a discussion of the importance of cyanobacterial blooms in relation to other water management issues (e.g., sewage and industrial pollutants) would be a useful addition to the next update of this essential handbook.

In summary, the book will be valuable to students needing an introduction to the subject, scientists that advise authorities responsible for management of waters affected by cyanobacterial blooms, and anyone wishing to know how their specific research area fits into the overall picture of cyanobacterial blooms.

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