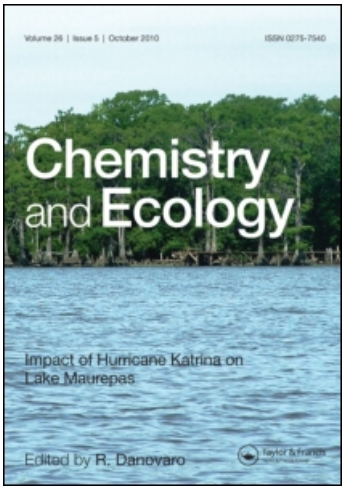

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A review of: "Detection Methods for Cyanobacterial Toxins"

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BOOK REVIEW

DETECTION METHODS FOR CYANOBACTERIAL TOXINS, Eds. G. A. Codd, T. M. Jefferies, C. W. Keevil and E. Potter, Royal Society of Chemistry 1994, Proceedings of the First International Symposium on Detection methods for Cyanobacterial (Blue-green Algal) Toxins, held on 27–29 September 1993 at the University of Bath, ISBN 085186 9610, 192 pp. UK Price (£45.00).

The preface to this book defines its remit to represent the Bath Symposium, the First International Symposium on detection methods for cyanobacterial toxins, aiming to foster humane research, disseminate information on the types of cyanobacterial toxins present in the aqueous environment, reduce duplication, encourage compatibility, facilitate the development and acceptance of methods, and increase contact and exchange between user groups. The Symposium was organized by the Department of the Environment Standing Committee of Analysts Algal Toxins Panel, part of its function being to consider standard methodology for the water industry and other water users and regulators. Westwood, representing the standing committee of analysts at the meeting, declared "Any method by any technique could be considered, the only promise being that no particular product, service or item of equipment will be endorsed by the committee". There were 120 participants from 17 countries and focus was on development and merits of methods for detection and quantification of cyanobacterial toxins; these were assessed in terms of requirements of sensitivity, specificity and other requirements.

Falconer's first paper gives a background to the hazards of toxins in fresh waters and indicates the levels considered safe. There is reference to recent works which have found saxitoxins present in freshwater *Anabaenas*. Hunter, likewise, consolidates existing knowledge on the epidemiology of toxin-related disease.

Fitzgeorge's work is some of the newest herein; he describes a comparison of the effects of various cyanotoxin administration routes to mammals. This is a useful idea very clearly presented. Intranasal and intraperitoneal administration routes are considered most effective. These issues are crucial in assessing potential threat to human health through drinking water or recreational exposure to cyanobacterial toxins.

What is novel in this volume is valid and of considerable interest and significance, but most of the information is known within the community. In its failings, the volume has some inaccurate and confusing data, and chromatograms that are poorly presented or labelled.

In precis, this book contains a background and introduction to the phosphatase assay system (considered by many as the best method so far) by MacIntosh, which is clear and concise; phosphatase 1 and 2a are inhibited by cyanobacterial microcystin, and as such their inactivation can be monitored. Sim and Mudge substantiate this as

the most effective and reliable means of detecting all hepatotoxic cyanobacterial toxins; Holmes, in a "Bioscreen" for detection of microcystins based on protein phosphatase bioassay, identifies novel natural toxins with potent biological activity. Hrudey *et al.* report on the health risks of blooms in drinking water. Steffensen reports on neurotoxins from freshwater algae, with PSP-like toxicity, associated with *Aphanizomenon flos-aquae* in New Hampshire. Similarly, there are reports here of gonyautoxins in the Murray-Darling River, attributed to *A. circinalis*. Harada and Tchernajenko give international perspective to these papers in reports of toxic blooms in Japan and the former Soviet Union, respectively.

Comparisons of detection methodologies are well covered; James describes the Water Research Council analysis method tested by five laboratories for the detection of low levels of microcystin LR. Assessment of the efficacy of a variety of water treatments in removing microcystin LR are clearly and graphically represented within the context of other relevant work.

Lawson *et al.* consider Diode Array Detection by UV spectra to identify microcystins and provide in-depth information on the occurrence and significance of microcystins and nodularins. DAD-HPLC accurately determines hepatotoxicity of samples showing a high degree of correlation with the mouse bioassay (as do the invertebrate bioassays), whereas Microtox, *Serratia* spp. tests, and tissue culture tests showed little correlation with hepatotoxicity as determined by mouse bioassay. Eriksson details the problems of using cell assays to determine the presence of microcystins in algal extracts; only laboratories with a great deal of experience in the technique can routinely obtain high quality preparations of rat liver cells. Gallagher *et al.* state the case for the use of synthetic chemicals in the production of standards of anatoxin-a and homoanatoxin. In overview, the need for elucidation of the toxicology of cyanotoxins in perhaps understated, but it rests as the "raison d'être" for many of these detection techniques.

The poster presentations include an array of international toxic case studies (incidents from Portugal, Belgium, Switzerland, Scotland, Finland and Germany) and a comparison of toxin extraction techniques and detection methods. Presentations are broad in the span of their interests and most are succinct. A few are poorly presented and unclear. Dow and Chaivimol independently report on the release and degradation of toxin into water by decaying cells, "Despite the highly toxic nature of biomass and detection limits of the hepatotoxins, 'free' toxins couldn't be detected in any raw water samples". This issue should be of prime importance to future researchers.

Overall, this book's content is not novel, but provides a sample of recent methodologies and comparisons of their sensitivities. Does it fulfil its objectives? Yes, it represents the meeting, details comparisons of the sensitivities of humane detection systems and provides an international forum for the exchange of information. Presentation is variable, as contributors have not followed editorial directions, and this has made some figures unintelligible. This is not a book of methods for the researcher to work from, but it may instigate communication between interested parties and promote discussion and interaction. It does, however, provide a guide to relatively recent techniques and problems in the area of cyanotoxins, appropriate to the interests of the scientifically inclined.

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