

## Muddy waters

Eville Gorham

**Acidification of Freshwaters.** By Malcolm Cresser and Anthony Edwards. *Cambridge University Press: 1987. Pp.136. £19.50, \$34.*

THE acidification of freshwaters is a controversial topic. The phenomenon is viewed by many as a consequence of acid deposition from the atmosphere, and by others as largely the natural result of ecosystem development, often influenced by human land-use. In their book, Cresser and Edwards attempt to take a balanced view, examining processes by which ecosystems acidify naturally and ways in which human activities — changes in land use, atmospheric emissions of sulphur and nitrogen oxides — influence acidification. The authors stress the complexity of the subject, and include useful references to infrequently cited British work, helpful notes on methodology and suggestions for future research.

So short a book inevitably has drawbacks. The history of the subject is confined to a mention of the pioneering work of Robert Angus Smith. Modelling is accorded two pages and a citation of the 1984 book edited by J.L. Schnoor (*Modelling of Total Acid Precipitation Impacts*). Target loadings to protect susceptible freshwaters from acid deposition are not considered, and important studies at the Experimental Lakes Area in northwestern Ontario, dealing with subjects such as the countering of acid deposition by

generation of alkalinity within lakes, and the very earliest stages of biological response to experimental lake acidification, are not mentioned.

The geographical extent of freshwater acidification, and its empirical relationship to bedrock and soil type and the severity of acid deposition, are not examined, although such considerations are helpful in assessing the factors involved in acidification. For instance, if natural acidification and land-use changes are of widespread importance in the acidification of clearwater streams and lakes, why is it largely restricted to regions where sensitive substrates are subject to precipitation with a mean pH of less than 4.8? In this connection it is nowhere explained that waters naturally acidified by organic acids produced during the decomposition of plant detritus, for instance the porewaters of surface organic soils or streams and lakes draining peatlands, can be distinguished by their yellow-brown colour and high concentration of dissolved organic matter from clear waters acidified by atmospheric deposition of strong mineral acids. The major role suggested for sodium chloride of marine origin in natural acidification is questionable.

A short book for a broad audience cannot cover everyone's favourite topics, but at least some of those mentioned above deserve attention in any account of fresh-water acidification. Despite these deficiencies, Cresser and Edwards have provided a useful introduction to the subject. □

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## Turning the tables for chemists

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**Calculated Molecular Properties of Polycyclic Aromatic Hydrocarbons.** By Ronald A. Hites and William J. Simonsick, Jr. *Elsevier: 1987. Pp. 272. Dfl. 260, \$126.75.*

THE polycyclic aromatic hydrocarbons are a large and important class of chemical carcinogens which enter the environment through the incomplete combustion of organic materials. Chromatographic techniques for the separation of complex mixtures of these compounds are quite well developed, although identification of the individual components is often tedious.

One solution suggested by the authors of the present volume is based on an empirical correlation between experimentally determined data from charge exchange chemical ionization mass spectrometry and ionization potentials calculated through quantum mechanics. *Calculated Molecular Properties of Polycyclic Aromatic Hydrocarbons* appears to be an outgrowth of that effort. It is not a textbook of any kind, but simply a tabulation of theoretical data for benzene and 270 polycyclic aromatic hydrocarbons obtained using the MNDO semi-empirical molecular orbital procedure.

Unfortunately, the introduction is a mere four pages in length and provides only a superficial description of the tabulated quantities. However, the data themselves are conveniently laid out. Each compound is described on a separate page by beginning with the preferred chemical abstracts name, followed by the molecular formula, molecular weight and CAS registry number. Next come the calculated heat of formation, total, electronic and nuclear energies, the energies of the highest occupied and lowest unoccupied molecular orbitals and the dipole moment. Calculated geometric data are not given, although a scale line-drawing of each structure is provided together with a table of calculated atomic charges. Two non-quantum mechanical properties related to the overall molecular shape are included; both are claimed to be useful predictors of chromatographic behaviour.

This is not a book for the general reader. But it is easy to think of situations in which some of the tabulated quantities could be of value to researchers in this area. □

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**Grim legacy** — the 'becquerel reindeer', a freezer of radioactive meat in a slaughterhouse in Swedish Lapland. Meat from reindeer feeding on lichen contaminated with caesium-137 from the Chernobyl cloud contained up to 16,000 becquerels per kilo; the maximum radiation normally allowed in Sweden is 300 becquerels per kilo. The photograph is taken from *At Work in the Fields of the Bomb* by Robert Del Tredici, a collection of photographic images on the theme of nuclear weaponry and installations. Published by Harper and Row, the book costs \$35 (hardback) \$15.95 (paperback).