

## Fungal poisons

*Molds, Mushrooms and Mycotoxins.* By Clyde M. Christensen. Pp. 264. (University of Minnesota: Minneapolis, May 1975.) \$11.50.

THIS is the latest in a series of books on fungi by the author. Four chapters deal with the toxic effects of fungi on man and animals. *Amanita*, *Claviceps*, *Penicillium*, *Aspergillus* and *Fusarium* species are considered together with a variety of other fungi. Two overlapping categories are recognised: those fungi which are directly toxic as in the case of *Amanita* (amanitins and phalloidin), *Claviceps* (ergot alkaloids) and *Aspergillus flavus* (aflatoxin), and those which produce toxins in plant material either in the field or during storage (mycotoxins—for example, as from *Aspergillus* spp.)

As in other books describing the effects of toxins, the accounts are arresting, even lurid. It is surprising how much 'poison' can be ingested in a typical western diet; certainly, black pepper and peanut addicts might note the dangers arising from aflatoxin contamination. It might have been stressed more, however, that the presence of the organism or its spores does not necessarily indicate presence of the toxin. The pharmacology of the toxins is only briefly discussed, perhaps

because, in general, comparatively little has been done.

Other chapters deal with dissemination and the allergies arising from spores released by fungi, fungi pathogenic in animals (including man), such as those producing ringworm, and fungi which attack 'living' wood and timber; the near impossibility of protecting susceptible living wood from attack is disturbing. The last chapter on evolution is barely relevant but helps to explode the myth that fungi arose from algae.

The text is highly readable; by turns humorous, facetious and, occasionally, prejudiced. It is pleasant to know that 'nematodes do not have the brains to be bored'; also that locusts almost entirely consumed by *Massospora* can still 'laugh and chat'—enviable sang-froid! Documentation is adequate (102 references are cited) but the 'popular' nature of the text results in debatable generalisations and some errors of fact and judgement; for example, catching a nematode on a sticky, hyphal peg is not mechanically comparable to catching a snake with adhesive on the end of a pencil eraser.

The book is suitable for the lay reader as virtually all chemistry is omitted and scientific terms are explained in detail. It can be used as a useful reference by the professional mycologist and to stimulate

students' interest to encourage them to do much-needed research in the field of mycotoxicology. Farmers and agriculturalists might benefit from the subjects covered; numerous examples throughout the book indicate that more knowledge here might be of considerable value in offsetting hazards arising from fungal activity.

A. G. Dickerson

## Dynamic processes

*Dynamic Nuclear Magnetic Resonance Spectroscopy.* Edited by Lloyd M. Jackman and F. A. Cotton. Pp. xiv+660. (Academic: New York and London, May 1975.) \$48.00; £23.05.

ALMOST since its first observation in bulk matter nuclear magnetic resonance (NMR) has been used for the study of molecular motion in solids and liquids. It was not until 1953, however, that Gutowsky and Saika suggested that it might be used to study chemical exchange dynamics in the liquid state. It is with those dynamic processes, chemical exchange, rotation about chemical bonds, molecular rearrangements and changes of conformation, that this book is concerned.

The first 160 pages are devoted to the theory of the effects of chemical exchange on NMR line shapes and widths and the nuclear relaxation times. The subject is most thoroughly covered, beginning with a delightfully clear historical introduction by H. S. Gutowsky, followed by four more chapters, some of them rather heavy going, by a distinguished group of experts. The fifth chapter, by R. Freeman and H. D. W. Hill is an elegant exposition of the problems of measuring spin-spin relaxation times in high resolution spectra, a procedure of such difficulty that it has not previously been much used.

The remaining 500 pages of the book, comprising ten further chapters, are concerned with an exhaustive review of the quite remarkable range of molecular processes which have been studied using this method, most of them involving intramolecular rearrangements in one form or another. No-one could fail to be impressed by the variety of systems studied, or by the ingenuity of the investigators, deriving information mostly unobtainable in any other way. The last chapter, by E. Grunwald and E. V. Ralph, on proton transfer, is the only one specifically concerned with intermolecular exchange.

This formidable and authoritative book is essential reading for organic and inorganic chemists concerned with molecular rearrangements; though its price may deter private buyers, it is nevertheless good value in these days of high printing costs. R. E. Richards

making distances per unit time proportional to the odd number series.

In the last paper, "Einstein on Scientific Revolutions," by Martin J. Klein, we find that Einstein wished to restrict the term to transformations, in Klein's words, "on the scale of the French or Russian Revolutions." His own series of papers on thermodynamics and statistical mechanics leading up to the Brownian motion paper of 1905—generally considered the definitive proof of atomic theory and the statistical nature of the second law—Einstein did not consider revolutionary because he was simply working through the consequences of mechanics. Nor did he consider the light quantum or special relativity theories of 1905 to be revolutionary, but only of heuristic value, as he described them both. Why? What Einstein did consider revolutionary was Maxwell's theory. But electromagnetic field theory was one thing and mechanics another. Reconcile

them, that is, unify the foundations of physics, and that, Einstein believed, would be a Scientific Revolution. Indeed it would. This paper is a gem, and should be required reading for anyone given to evaluating scientific discoveries. These five papers are followed by a lengthy discussion that is partly interesting and partly rambling.

Finally, there are papers concerned more with cultural or intellectual history. Benjamin Nelson compares the reception of Copernicanism with regard to "probability" and "reality" in Europe and by the Jesuits in China. Robert Palter's "Some Episodes in the History of Copernicanism" contains some observations on later opinions of Copernicus, but what this curious, wandering essay is about eludes me. Edward Rosen contributes a diatribe against an unnamed writer (Arthur Koestler), whom he calls "our detractor," that violates every canon of scholarship and taste. Koestler's *The Sleepwalkers*, even if it contains errors, is an intelligent study that does not deserve this rude treatment by a professional historian of science. "The Humanistic Significance of Our Copernican Heritage" by Jerome R. Ravetz is a model of eloquence. Learned, stimulating, and philosophical by turns, Ravetz considers Copernicus' life and work, his followers, interpreters, and critics, and our Copernican heritage.

\**Copernicus: Yesterday and Today.* (Proceedings of the commemorative conference held in Washington in honour of Nicolaus Copernicus, *Vistas in Astronomy*, Volume 17.) Edited by Arthur Beer and K. Aa. Strand. Pp. xxxiii+225. (Permagon: Oxford and New York, 1975.) Subscribers' price: \$40.00, £17.00; Non-subscribers: \$50.00, £21.00.