Book Reviews

Carcinogens

Aflatoxin. Scientific Background, Control, and Implications. LEO A. GOLDBLATT, Ed. Academic Press, New York, 1969. xiv + 474 pp., illus. $12.50. Food Science and Technology, vol. 7.

Discovery of aflatoxins—a family of the most virulent carcinogens known—came at a time when man was beginning earnestly to contemplate how meager the bounds of the earth's ecosystem are and how soon the by-products of biological and industrial intensification would imperil his existence. Thus, in a segment of science already sensitized to the menace of chemically induced disease, the finding of carcinogens in some primary human and animal food staples catalyzed research as few events have in history.

This monograph is a digest of the decade of research on aflatoxins since the "turkey X disease" episode in Great Britain in 1960. It tells in detail the story of the discovery and the remarkably swift elucidation of the structure of the compounds. Pathogenesis and metabolism in farm and laboratory animals and in fish are carefully described and compared with characteristic effects of other carcinogens. Analytical methodology, both biological and physicochemical, is authoritatively presented and evaluated. Several chapters are devoted to the occurrence of mycotoxins and toxigenic fungi in human food and livestock feed. Four chapters deal with contamination control and regulation in foodstuff and provide a rather rare insight into the complex, and sometimes economically painful, machinery that functions from the farm to the consumer to ensure wholesome food in the marketplace.

Although the aflatoxins have been an expensive nuisance, their discovery was also fortunate. From aflatoxin research has come an appreciation of the insidiousness of toxigenic fungi in human diseases and the capriciousness of fungi never kindled by the many recorded episodes of mycotoxin poisoning throughout modern and medieval history.

Epidemiological studies, goaded and given direction by the geographical associations of aflatoxins, point to a vital etiological role of mycotoxins in human diseases, particularly in nonindustrialized areas of Africa and Asia. Even in countries with advanced agricultural technology, postharvest spoilage of fruits, vegetables, and grains ranges up to 10 percent, much of it due to or accompanied by toxigenic fungi. In areas where quality control is less than rigorous, often nonexistent, there is no doubt that dangerous quantities of contaminated food are eaten, for it is not likely that a hungry people who suffer chronic malnutrition will discard any but the vilest rations.

Awareness of these problems is an invaluable spin-off from aflatoxin research, but it is not the only bounty. We are reminded now that toxigenic fungi are ubiquitous and that their biosynthetic activities are strongly influenced by physicochemical factors around them, particularly by nutrition. Moreover, hybridization is perpetual among some species, and many of them are prone to mutation. Thus, new strains with new and unpredictable biosynthetic capabilities constantly come into being. Intuitively, we can expect the spectra of fungi and toxins to expand as man, through his industry and quest for food, further modifies his environment.

The authors of this book have written meticulously from their own experience and from the findings of others. They have provided sufficient detail and data for in-depth appreciation of aflatoxins, and, in many instances, for useful reference without resort to the original papers. The end product is an authoritative source book which will serve well as a reference and a guide to future mycotoxin research.

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Facts of Zoogeography

Dynamic Zoogeography. With Special Reference to Land Animals. MIKLOS D. F. UDVARDY. Illustrated by Charles S. Papp. Van Nostrand Reinhold, New York, 1969. xviii + 446 pp. + plates. $17.50.

It is a fact, cheerfully ignored by most of its would-be practitioners, that biogeography is far and away the most difficult of all the biological sciences. The task of this discipline is truly formidable: to account for the chaotic distributional data of systematics by means of the basic principles of geology, climatology, meteorology, evolutionary theory, and population and community ecology. College courses in biogeography seldom even make the attempt. The few general textbooks on the subject are innocent, myopic failures. The book under review here, *Dynamic Zoogeography,* unfortunately continues the tradition of, first, failing to present a clear view of the foundations of the subject, and, second and much more seriously, failing to expose even indirectly what it was that was not comprehended.

It must be nevertheless added at once that *Dynamic Zoogeography* has certain strong points that make it a worthwhile purchase. It is at the very least a meticulous and detailed coverage of much of the factual material of terrestrial zoogeography. Udvardy has probed deeply into the literature to bring out numerous case histories of the most diverse kinds of distributional phenomena. The illustrations are numerous and of high quality, and close attention is paid throughout to the historical background of each of the topics. The author's command of foreign languages, and particularly of the difficult, anecdotal German literature, has been put to good use. One of the most commendable results is the focusing of attention on some important pieces of research hitherto largely neglected in conventional evolutionary reviews. I was very pleased to find examples of Carl Lindroth's outstanding contributions on carabid beetle evolution made the subject of the frontispiece and frequent discussions throughout the book. Readers will be grateful to have a convenient reminder of the contributions of Hesse, Kalela, Reinig, Rübel, Salomonsen, Shelford, Schwerdtfeger, Voous, and literally hundreds of other major and minor figures in the history of the subject.

Udvardy's style makes the book

a browser's delight. One can pass effortlessly from a photograph of a real natural raft, composed of a floating nipa palm, just as it makes a landfall on the coast of New Guinea, to a map of the advance of the bagworm moth *Solenobia triquetrella* behind the retreating Rhone Glacier during the past 100 years, to an account of what strictly limits the distribution of a termitophilous varanid lizard in Africa (it is the availability of the termite mounds required for egg-laying), and so on at great length. The reading could be especially salutary for ecologists and population biologists whose training has been mostly restricted to theoretical and experimental aspects.

At the same time, the author's strenuous attempt to achieve breadth has produced a packed jumble of facts and all-too-fleeting references to ideas. This material is not well organized. Worse, it is treated in a generally uncritical and shallow manner. A large part of the difficulty is the failure on the part of the author to utilize the most basic ideas of ecology and speciation theory, even though he abundantly acknowledges their importance. The subject of species diversity is duly introduced, for example, but most of the central ideas under current discussion in the ecological literature are either overlooked or misconstrued. The same is even more true of competition theory, community ecology, and species equilibrium theory, each of which the author himself stresses is vital to modern biogeography. The biological aspects of dispersal and colonization are described *in extenso*, but their quantitative study—an aspect already well advanced in the literature—is largely neglected. The problem is that descriptive biology, not theory and mensuration, is the author's métier. Unfortunately, the biological facts are not enough to create a modern introduction to biogeography.

There are also some disturbing omissions in the coverage of more traditional topics. W. D. Matthew's work, for example, is correctly cited for its importance in stressing the role of climate in evolution and dispersal. But this is secondary—the lasting significance of Matthew's *Climate and Evolution* is that it presented the first general theory of dispersal and faunal turnover in an attempt to account for global distributions. For this reason it can fairly be regarded as the true beginning of dynamic zoogeography. Just as importantly, Matthew's conception led logically to the principal idea of P. J. Darlington's *Zoogeography* (1957), that of the Old World tropical origin and continuous radial replacement of major vertebrate groups. Right or wrong, and it is most probably right, this is surely one of the most original and intensively discussed ideas of modern zoogeography. I would have expected it to occupy a prominent position in any textbook specializing on dynamical and terrestrial aspects; but the author ignores it completely. Also missing is a review of the history of the mammal exchanges between Eurasia, North America, and South America. This subject, which has provided such important new insights into the role of land bridges, the existence of faunal balance, and other important subjects, simply cannot be passed over—it is like leaving *Escherichia coli* out of a modern genetics text.

Reviewers often take leave of a poor textbook with a left-handed salute, stating that it can serve as a useful reference work but not as a textbook. I am compelled to say that this is acutely the case for *Dynamic Zoogeography*. It is such a rich source book that it will certainly aid and may even influence to some extent future research in zoogeography. But because of its uncritical approach, lack of balance, and especially its weakness in the ecological foundations of the subject, it cannot be recommended as a textbook.

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Biological Dynamics

Elementary Rheology. G. W. SCOTT BLAIR. Academic Press, New York, 1969. xii + 160 pp., illus. $5.50.

In his prefatory note Scott Blair claims that this book is not intended for rheologists but rather as an introduction for persons having no knowledge of the field whatsoever. While his book suits this purpose admirably, I believe he has underestimated its appeal.

Elementary Rheology is clearly elementary in a technical sense, that is, its reading requires only the most rudimentary knowledge of mathematics. The physical descriptions of rheological events given here are, however, much more lucid than those found in more technically advanced books. Further, the author both informs and entertains his reader with a fascinating running commentary on the history of the subject, ranging from Robert Hooke's mistrust of his fellow scientists and deviousness in concealing Hooke's "law" from them in the 1600's to a current debate (to which the author is a party) over the applicability of certain constitutive equations to the flow of blood.

The two short chapters on biorheology provide an interesting synopsis of the subject and point out the importance of rheology to such various phenomena, in normal and diseased states, as flow of blood in the microcirculation, lubrication of joints, streaming of protoplasmic material, and the swimming motion of spermatozoans and viscometric properties of vaginal mucus as they affect fertility. One of the unusual experimental observations presented here is that spermatozoans tend to align themselves parallel to streamlines in a shear field but return to a preferred orientation upon termination of the shear. Clearly this fact must be related to the fertilization process, but it appears not now possible to say exactly how.

This reviewer received his introduction to the area of "psycho-rheology" through reading the descriptions given here. Measurement of subjective material properties such as "body," "texture," "toughness," and "spreadability" is certainly of importance in the manufacture and marketing of food products, particularly dairy items such as cheese and butter. The author notes that while housewives can judge these properties fairly easily, rheologists have a more difficult time!

It should be mentioned that the section in which complex moduli are introduced is rather demeaning to one's intelligence and out of keeping with the rest of the book. It is difficult to conceive of a person interested in reading this book who would not know what either sinusoidal motion or imaginary numbers are.

An appendix describing the theoretical bases for over a dozen common viscometric methods and a reading list complete with the author's appraisals of its entries round out this highly readable monograph.

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