Meeting on Radiation

Second Tihany Symposium on Radiation Chemistry. Proceedings, May 1966. JÁNOS DOBÓ and PÉTER HEDVIG, Eds. Akadémiai Kiadó, Budapest, 1967. 829 pp., illus. $28.

The Second Tihany Symposium on radiation chemistry was more nearly an international one than the first, with a fairly large representation from the West, although the bulk of the papers originated in eastern Europe. This volume is therefore of considerable interest to readers in this country, as it provides, in English, a valuable entry to the radiation chemistry literature of a part of the world that has been especially active in the study of radiation effects. Over 100 papers are presented, in four general categories: inorganic and biological, aqueous solutions, organic systems, and polymers. The last makes up the bulk of the volume, approximately half the papers being devoted to various aspects of the formation or modification of polymers by ionizing radiation. These range from fundamental studies on the mechanisms of polymerization to a discussion of the modification of polyester tire cord by gamma radiation.

The section devoted to organic systems contains a number of valuable contributions in such fields as charge separation in nonpolar liquids, the trapping of electrons in solids, and the radiation chemistry of such extensively investigated systems as methanol, benzene, and methane, as well as investigations in a number of more exotic fields.

The radiation chemistry of aqueous systems is discussed in 18 papers ranging in subject matter from the determination of short-lived intermediates by pulse techniques to studies aimed at developing multi-megarad dosimeters. Other topics include the origins of hydrogen from irradiated solutions, the nature of the HO_2 radical, and the behavior of water adsorbed on silica gel.

Among the general papers are to be found a discussion of excitation transfer, an a priori calculation of the yields from irradiated water vapor, and an investigation of the mechanisms of radiation protection in biopolymers.

The volume is handsomely produced and is quite substantial in appearance. It is reasonably well indexed, and for the most part the articles, whether written in English or translated into it, are quite readable. The discussion following each paper is also reproduced, somewhat polished in form, one would imagine, but often providing additional insight into the problems considered in the paper.

There remains, then, only the question of the desirability of publishing such volumes as this at all. Some things can be said on both sides of that question. It is certainly convenient to have all these papers readily available in one volume. On the other hand, it will probably not be widely distributed, which markedly reduces this availability to the mass of those interested, whereas publication in the usual journals means ready accessibility to all. Publication in the regular journal literature also implies careful refereeing, something which is usually not employed in the preparation of such volumes as these. In balance, it would seem to me, in this particular case, that in view of the origins of many of the papers, publication in the present form is deserved and this will be a useful volume.

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Motion

The Science of Movement. R. A. R. TRICKER and B. J. K. TRICKER. Elsevier, New York, 1967. 298 pp., illus. $9.

Here is a simple and unpretentious volume about the physics and biology of motion. So little background is assumed that any advanced high school student could read it with ease, yet the term "science" in the title is so obviously appropriate that no serious investigator need feel insulted. Facts and opinions, laws and conventions, proofs and demonstrations are quite clearly distinguished. About half the chapters are devoted to the development of the concepts of classical mechanics, with the historical perspectives neatly dovetailed with physical demonstrations. The ingenious exercises used to illustrate principles such as the conservation of angular momentum are conceived in the best string-and-sealing-wax tradition and provide fine examples of careful empirical measurements organized so as to create a logical structure.

The other half of the book (the boundaries are by no means clear) is concerned with description of the biological machinery effecting and coordinating motion, together with the application of physical principles, as they are developed, to the movements of organisms. These biophysical portions are equally effective although, of necessity, the authors' shots are more scattered. Generous space is given to athletics, in particular to the application of physics to the improvement of performances; this should greatly increase the attractions of the book for nonscientists. By contrast, animal locomotion gets more cursory treatment: Sir James Gray's *How Animals Move* seems to be a hard act to follow!

The breadth of the area covered provides both the main appeal and principal weaknesses of the book. The treatment, especially of the more biological topics, is highly (and often dismayingly) superficial. Occasionally, questionable statements crop up. The explanation of the role of dimples on golf balls is not the one usually given, and the tail of the dogfish appears to have been inverted along with the account of the function of its asymmetry. But inaccuracies are surprisingly infrequent considering the nature of the book and the prevalence of misinformation in the serious literature on the biology of movement. Indeed, the lucid treatment of recent progress in the physiology of nerves and muscles is unexpected in a popular account attempting to survey a wide field. And it is a distinct pleasure to encounter such diverse topics as Aristotle's mechanics, the sliding filament model of muscle contraction, and the mid-air righting of cats all nicely integrated under a single cover.

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Biological Relationships

Symbiosis. Vol. 2, Associations of Invertebrates, Birds, Ruminants, and Other Biota. S. MARK HENRY, Ed. Academic Press, New York, 1967. 461 pp., illus. $17.50.

The concept of symbiosis was introduced in 1879 by the botanist De Bary, who defined it as "the appearance of cohabitation of unlike organisms." He included parasitism, mutualism, and commensalism as special cases. Examples of mutualism and commen-

salism are of prime concern in the present volume. The first chapter, on insects and their endosymbionts (A. Koch), raises the possibility that insect symbiosis with other organisms may have existed since the Devonian, the time when the roaches and the termites separated from their common ancestor. Seven major types of insects that are permanent bloodsuckers have endosymbionts. Among these insects are the triatomid bugs that carry Chagas' disease. The means by which symbionts are transmitted to the offspring are diverse in insects; they include invasion of the egg. The chapter on insect ectosymbiosis (A. Hartzell) considers the cases of arthropod with arthropod, as in mites with army ants, ants tending their ant "cows," and the slave-making ants. The fungus-growing ants, found from 40°N to 44° (not 40°) S, are in a mutualistic type of symbiotic relationship with several species of fungi that are not found except in the ant gardens. Ectosymbiosis in Wood-Inhabiting Insects (H. Francke-Grosmann) deals particularly with ambrosia beetles and their fungi. A fungus isolated from ambrosia-beetle galleries is considered to be a true ambrosia fungus when it produces in culture the same stages it produces in the tunnels. Beetles and attine ants are quite different in their relations with their fungi. "The only action of the beetles that could be regarded as a true fungus culture is the preparation of special beds consisting of feces and wood frass." In contrast, the ants forage for substrate, add their saliva and fecal droplets to it, and, after it has been cut to size, then pick up pieces of the mycelium and plant them on the particle.

Ectosymbiosis in Aquatic Insects (A. W. Steffan) treats such internal symbionts as ciliate protozoa, nematodes, and acarines. In turn insects may live on or in Porifera, Bryozoa, and Mollusca. The diversity of insects being what it is, there are numerous examples of insect-insect relations. Avian Symbiosis (H. Friedmann) deals with bird-arthropod, bird-mammal, and bird-bird relations. All three animals may be involved, as in the African oxpecker feeding regularly on ticks on African big game. Intestinal microorganisms of ruminants and other vertebrates (B. H. Howard) are considered more on the biochemical basis than they have been in earlier studies. Herbivores have the greatest microbial activity and in fact may have evolved only because of their association with fiber-digesting microbes. Carbohydrate fermentation, nitrogen transformations, and lipid metabolism are considered, as is vitamin synthesis.

Each chapter has an extensive bibliography. The volume is worthwhile for this feature alone but goes far beyond in being a most useful consideration of a rapidly growing and complex field with infinite applications.

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Public Health Problem

Transmission of Viruses by the Water Route. Based on a symposium, Cincinnati, Ohio, December 1965. GERALD BERG, Ed. Interscience (Wiley), New York, 1967. 502 pp., illus. $15.

The symposium reproduced in this volume was held in search of answers to such questions as: What is the significance of viruses in water? What methods are available for quantitative detection of small amounts of viruses in large volumes of water? What answers are needed to protect the public health from the transmission of viral diseases? In an attempt to answer such questions, 68 highly qualified scientists, engineers, and sanitarians presented and discussed 31 papers covering the general topics of survival of viruses in wastes and waste water, the minimal infective dose of viruses, the quantitative recovery of viruses from dilute suspensions, and the epidemiology of transmitting viral diseases by water. Although the answers to many questions of public health significance can be found in the papers, other new ones were raised by the participants which indicate that our knowledge is far from complete on the survival and transmission of viruses in water.

Because of the unevenness of the writing in several chapters, and especially because of what is recorded in some of the discussion sections, there is a lack of continuity. The book is therefore not easy to read from cover to cover. But it will serve as a valuable reference volume, for it contains much worthwhile information that is difficult to find elsewhere without an extended search. Parts of the discussion sections could have been edited more extensively or deleted; one wonders what kind of controlled experiment in immunology, pathogenicity, or epidemiology the following statements represent: "Two years ago, 11 of my colleagues and I swam in a swimming pool which we had seeded with 10 $TCID_{50}$/ml of Sabin poliovirus 2. This level of virus was insufficient to infect any of us. Of course, we had all received Salk vaccine and at least some of us had received Sabin vaccine. If we could have seeded with perhaps 10,000 $TCID_{50}$ per ml, we might have had some infection."

Techniques are cited in the book that are capable of detecting in sewage and polluted water such agents as the poliovirus, the virus thought to be responsible for infectious hepatitis in man, and certain enteroviruses of animals. As these methods are improved it may be possible to monitor water routinely for viruses, as is now done for fecal bacteria from man and animals.

With the poor distribution of natural waters for drinking purposes in certain areas, and with the rapid growth of the population, it will soon become necessary to renovate and reuse the waste water of many communities. Thus we will need to know all we can on this topic of this symposium.

The book contains remarkably few errors, and its physical makeup is excellent.

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Books Received

Advances in Ecological Research. vol. 4. J. B. Cragg, Ed. Academic Press, New York, 1967. 323 pp. Illus. $13.50. Four papers.

Advances in Physical Organic Chemistry. vol. 5. V. Gold, Ed. Academic Press, New York, 1967. 428 pp. Illus. $19.50. Six papers.

Air Conditioning Engineering. W. P. Jones. St. Martin's Press, New York, 1967. 518 pp. Illus. $18.

Algebra. vol. 1. L. Rédei. Translated from the Hungarian edition. Pergamon Press, New York, 1967. 841 pp. Illus. $21.50. International Series of Monographs in Pure and Applied Mathematics.

Animal Toxins. An international symposium (Atlantic City, N.J.), April 1966. Findlay E. Russell and Paul R. Saunders, Eds. Pergamon, New York, 1967. 442 pp. Illus. $18.50. Forty-four papers.

Animals of the North. William O. Pruitt. Harper and Row, New York, 1967. 183 pp. Illus. $5.95.

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