

Book Review

Comparative Effects of Radiation. By M. BURTON, J. S. KIRBY-SMITH, AND J. L. MAGEE. Wiley, New York, 1960. 426 pp., \$8.50.

This book is a compilation of the papers and discussions of a conference held in Puerto Rico in 1960. The participants were biologists, chemists, and physicists. Ionizing, ultraviolet, visible, and near infrared radiations were considered. Although topics of discussion ranged from apple bruises to gas molecules, the approach was that of the physical chemist and processes were considered in the light of energy transfer. The general approach was to contribute to the understanding of the basic effects of radiation on living matter through a discussion of the different kinds of actions recognized when comparing ionizing to nonionizing radiations on both complex and relatively simple molecular aggregates.

The Editors made a very commendable effort to prepare the Discussions so as to retain remarks which showed development of new ideas. Pertinent criticisms have been retained, but the material was not left in the informal disorganized state which (though clear at the time) often loses meaning in the printed version.

The very earliest and final steps in energy absorption are referred to briefly but much of the discussion is related to theories of electronic energy levels, such as that of excitons as mechanisms for migration of electronic excitation to points remote from the place of initial absorption. The production and diffusion of radicals in water and the relation of these to direct and indirect action on organic molecules is also discussed by several writers. Irradiation of monolayers, the influence of oxygen at different temperatures, photo reactivation electron spin resonance, inactivation of viruses, molecular resonance, structural changes in DNA, and effects on long chain polymers (degradation, cross linking) are among the many topics discussed.

The first chapter by C. P. Swanson contrasts, from the cytochemists point of view, initial effects resulting from absorption of ionizing, ultraviolet, far red, and infrared radiation. The second paper by Ugo Fano is on the collec-

tive effects in absorption of energy from ionizing radiation and is outlined point by point, almost restricting it to an explanation of pertinent terms. The next report by S. B. Hendricks discusses a photoresponsive pigment, which controls plant growth and plant differentiation from a physico-chemical point of view. C. S. Rupert then discusses the mechanism of photo reactivation of ultraviolet damaged DNA, enzymes, etc. In Chapter V, Michael Kasha reviews briefly the principles of photochemistry in discussing molecular changes brought about by absorption of ultraviolet radiation. Structural aspects of radiation effects on nucleic acids and related substances are then described by Bernard Pullman and Alberte Pullman.

The next three papers by John L. Magee, C. J. Hochanadel, and W. H. Hamill, deal with radiation chemistry of aqueous systems. The reader is led from the initial absorption of energy through the reactions leading to both direct and indirect effects on organic molecules. The sequence is then carried on to a discussion of direct and indirect effects on biological systems by M. Ebert. The chapter by A. Charlesby on recent advances in the study of irradiated polymers then follows, and the final two chapters by T. H. Förster and by H. Kallmann deal with excitation transfer and energy transfer processes. Just before the last two papers, Franklin Hutchinson discusses radiation effects on monolayers from the biological point of view.

As the Editors point out, attempts of the physicists, chemists, and biologists to talk together about radiation effects are still difficult, but the barriers are being pierced and light is beginning to shine through.

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(Editor's Note: Dr. Evans is head of the Radiation Research Laboratory in the College of Medicine of the University of Iowa. He has been a pioneer in studies of the effects of radiation on living tissue and has been responsible for much of the research on the basis of which the current values of the relative biological effectiveness of fast neutrons are determined.)