

hemostasis and experimentally induced thrombosis in pigs. One is struck by the susceptibility of the platelet surface to the injurious effects of a wide variety of substances, including antigen-antibody complexes, polystyrene, and collagen.

In summing up the symposium Greenwalt reminds us that much of the work presented is concerned with platelets of animal species and that it is not possible to say to what extent the platelets of guinea pigs, dogs, and rabbits are suitable models for learning what happens in man. This book is well produced, it contains many excellent microphotographs of platelets, and the lists of references which appear at the end of each chapter are up to date and fairly comprehensive. To anyone wishing an authoritative account of platelets and their function in hemostasis this book is to be recommended.

C. R. RIZZA

*Oxford Haemophilia Centre,
Churchill Hospital,
Oxford, England*

Hibernators

Mammalian Hibernation III. Proceedings of the 3rd international symposium, Toronto, Sept. 1965. KENNETH C. FISHER, ALBERT R. DAWE, CHARLES P. LYMAN, EDUARD SCHÖNBAUM, and FRANK E. SOUTH, JR., Eds. Elsevier, New York, 1967. xiv + 535 pp., illus. \$22.50.

Students of mammalian hibernation comprise an informal but rather cohesive group tracing its origins to the first international symposium on this subject in 1959 and to the subsequent formation of the Hibernation Information Exchange. The proceedings of their third symposium differ from those of earlier ones [*Bull. Mus. Comp. Zool. Harvard Coll.* **124** (1960); *Ann. Acad. Sci. Fennicae Ser. A IV* **71** (1964)] in emphasizing review papers. Those by E. T. Pengelley and F. Strumwasser *et al.* deal with the important question of factors governing the timing of various events associated with hibernation. The latter authors treat methods of analyzing circadian rhythms and show the relevance of these to the study of various functions of hibernators. Their suggestions concerning possible mechanisms for triggering periodic arousals and for controlling the circadian rhythm of hibernation found in certain ground squirrels appear worthy of careful consideration.

Current knowledge of mechanisms governing sleep does not suggest any close relation to those of hibernation, according to W. C. Dement. N. Mrosovsky documents the superiority of hibernators over other mammals in reactivity and behavioral capacities at low body temperatures. Little is known concerning the learning capacities of these heterotherms. H. T. Hammel's account of the central neural mechanisms controlling thermoregulation and of the modifications of these mechanisms that might occur in hibernators upon entry into and during torpor is obviously relevant to the understanding of many aspects of the hibernation process.

Much of the material in the 1959 symposium dealt with animals in the process of arousal. The increasing application of procedures allowing study of torpid animals without disturbance is reflected in B. W. Johansson's review of cardiovascular function. K. C. Fisher and J. F. Manery further enhance understanding of the physiology of dormant individuals through an analysis of problems of water and electrolyte metabolism and of the handling of nitrogenous wastes.

F. E. South and W. A. House treat energy metabolism of hibernators, including a consideration of metabolic pathways and the utilization of various energy stores. R. L. Smalley and R. L. Dryer provide an evaluation of the role of brown fat in hibernation; its role now appears to extend to other things in addition to thermogenesis.

Tissue functions of hibernators have undergone significant compensation for temperature, as is evident from the contributions by J. W. Hudson and J. S. Willis. The latter's paper can be read with profit by persons interested in temperature adaptation in poikilotherms as well as by specialists on hibernation.

Hibernators appear to have special utility in studies of the action of certain agents. J. P. Schmidt and R. G. Lindberg consider them in connection with such things as ionizing radiation, parasites, infectious agents, and certain aspects of space research.

Twelve invited research reports augment the various reviews. The only unsatisfactory aspect of the proceedings is the treatment of the discussion following these contributions. The various comments are condensed in such a manner as to mute the controversy that must have developed on a few occasions. However, this does not seri-

ously detract from the usefulness of the proceedings volume with its bibliography of more than 1300 titles. It provides a valuable appraisal of the current state of research on hibernation and some indicators of directions for future studies.

WILLIAM R. DAWSON

*Department of Zoology,
University of Michigan, Ann Arbor*

Weapons

Fungicides: An Advanced Treatise. Vol. 1, Agricultural and Industrial Applications, Environmental Interactions. DEWAYNE C. TORGESON, Ed. Academic Press, New York, 1967. xviii + 697 pp., illus. \$29.

Fungi and men compete with each other in the balance of nature. If a fungus wins, the balance goes one way. If man wins it goes another. A fungus won in 1845 by killing the potatoes in Ireland. The Irish starved. Another fungus won in 1943 by killing the rice in Bengal. The Indians starved. Fungi came close to winning in the South Pacific during World War II. They rotted everything in sight from the lens mountings on range finders to the shoes on the feet.

Man fights back with fungicides—chemical compounds to kill fungi. The first great dramatic win by man was Bordeaux mixture, a copper complex that saved the French wine industry in 1885. Forty years earlier it would have saved the Irish potato crop.

Since 1885, fungicides have become so plentiful, so complicated, and so scientifically interesting that they now demand a two-volume advanced treatise that covers the theory and to some extent the practice.

The first volume covers agricultural and industrial uses. Since agriculture consumes the lion's share of fungicides, the most data have been developed in that field, and thus the most attention is devoted to it. To use the modern idiom, the book is a conglomerate. It was edited by D. C. Torgeson and written by numerous authors scattered over the world. Since the editor has chosen his authors well, he has produced a good book which all the fungicide people and many others as well will want to have.

Perhaps the most fascinating chapter is that by Van Der Plank, who covers the quantitative relationship between the amount of fungus in the vicinity of a crop and the amount of disease that