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.

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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 circannian 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 seriously 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.

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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

will result depending upon whether fungicides are used or not. There are other chapters, of course: fungi on foliage and fruit, fungi on wood, and fungi on paper, plastics, paint, fuel oil, and so on.

If one wishes to learn about the fight with the fungi and how even the fungus fights back by degrading fungicides, I think he will find this book useful and satisfying. I shall look forward to the second volume.

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Protein-Analysis Technique

Electrophoresis. Theory, Methods, and Applications. Vol. 2. MILAN BIER, Ed. Academic Press, New York, 1967. xviii + 553 pp., illus. $21.

It is evident from volume 2 of this series that the electrophoretic method has received widespread application. In the new volume, applications have assumed the predominant role, whereas theory and methodology predominated in volume 1. It is also evident that the resolving power, speed, and simplicity of electrophoresis on paper, on starch gel, and more recently on polyacrylamide gel, have accounted for its unprecedented utilization in biology.

Among the contributions to this volume are reviews devoted to the application of electrophoretic methods for the identification of normal human serum proteins, protein variants in human serum, antibodies and myeloma proteins, the macromolecular constituents of lymph and cerebrospinal fluid, and gastrointestinal secretions. Each of these is a complex protein system which can be uniquely resolved by electrophoresis, alone or in conjunction with immunological techniques, and the ways in which this can be done are described. The chapter by Burtin and Grabar on the nomenclature and identification of the normal serum proteins is a clearly written and well-organized review. A significant portion of the chapter on the inheritance of protein variation in human serum by B. H. Bowman is a review of the molecular biology of genetic variation. The author's intent is to point out the impact that this subject has on understanding of the variations in serum proteins. However, because there are many unanswered questions on the structure and macromolecular configurations of the serum proteins, attempts to relate the two kinds of variation may be premature, especially since there are still differences (with respect to initiators, histone control, and so on) to be resolved between *Escherichia coli* and mammalian systems. H. M. Grey provides an informative review of the structure of the myeloma proteins and their relation to the immunoglobulins, particularly with reference to the portions of the heavy and light chains which contribute to the antibody moiety and the crystallizable or tissue-binding moiety.

In the chapter "Primary protein structure," by Sorm and Meloun, only one-fourth of the information is related to electrophoretic techniques. Unfortunately, only brief mention is made of the "diagonal electrophoresis" method of Hartley and co-workers [see *Science* **156**, 376 (1967)]. In his chapter "High resolution techniques," Bloemendal stresses the advantages of gel electrophoresis over other methods. His review of the techniques and literature on the many applications of gel electrophoresis is excellent, and he is even kind enough to include sources from which current information on the latest applications may be obtained.

In general, the volume is a thorough compilation of reviews on the theory, methods, and applications of electrophoresis, with some references dated as recently as 1967. It should be useful, as is volume 1, as a reference manual to any investigator utilizing the electrophoretic method.

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Books Received

The Addictive States. Proceedings of the Association for Research in Nervous and Mental Disease, New York, Dec. 1966. Abraham Wikler, Ed. Williams and Wilkins, Baltimore, 1968. xii + 520 pp., illus. $24.

Advances in Atomic and Molecular Physics. Vol. 3. D. R. Bates and Immanuel Estermann, Eds. Academic Press, New York, 1967. xii + 371 pp., illus. $16.50.

Advances in Immunology. Vol. 8. F. J. Dixon, Jr., and Henry G. Kunkel, Eds. Academic Press, New York, 1968. xvi + 246 pp., illus. $12.

Advances in Microwaves. Vol. 3. Leo Young, Ed. Academic Press, New York, 1968. xiv + 450 pp., illus. $19.50.

Advances in Organometallic Chemistry. Vol. 6. F. G. A. Stone and Robert West, Eds. Academic Press, New York, 1968. xvi + 363 pp., illus. $16.50.

Advances in Quantum Chemistry. Vol. 4, 1968. Per-Olov Löwdin, Ed. Academic Press, New York, 1968. xvi + 334 pp., illus. $17.

Alchemical Studies. C. G. Jung. Translated by R. F. C. Hull. Princeton University Press, Princeton, N.J., 1967. xiv + 453 pp., illus. $7.50. Bollingen Series 20. The Collected Works of C. G. Jung, vol. 13.

Alcoholism and Mortality. Per Sundby. Universitetsforlaget, Oslo, Norway, 1967 (distributed in the United States by Rutgers University Center of Alcohol Studies, New Brunswick, N.J.). 207 pp. $8. Alcohol Research in the Northern Countries. National Institute for Alcohol Research, Publication No. 6.

Allgemeine und experimentelle Immunologie und Immunpathologie. Sowie ihre klinische Anwendung. Carl Steffen. Thieme, Stuttgart, 1968 (distributed in the United States by Intercontinental Medical Book Corp., New York). xxiv + 702 pp., illus. DM 89.

An American Genius. The Life of Ernest Orlando Lawrence. Herbert Childs. Dutton, New York, 1968. 576 pp., illus. $12.95.

American Indian Painting of the Southwest and Plains Areas. Dorothy Dunn. University of New Mexico Press, Albuquerque, 1968. xxviii + 429 pp., illus. $25.

Astronomy. Globes, Orreries and Other Models. H. R. Calvert. Her Majesty's Stationery Office, London, 1967 (distributed in the U.S. by British Information Services, New York). Unpaged, illus. Paper, $1.20.

Anabolic Steroids. H.-L. Krüskemper. Translated from the German edition (Stuttgart, 1963) by Charles H. Doering. Academic Press, New York, 1968. x + 236 pp., illus. $12.50.

An Atlas of the Brains of Fishes of Japan. Hideomi Tuge, Kiyoshi Uchihashi, and Hatsurtaro Shimamura. Tsukiji Shokan, Tokyo, 1968. 240 pp., illus., boxed $75.

Antibiotics. David Gottlieb and Paul D. Shaw, Eds. Vol. 1, Mechanism of Action (xii + 785 pp., illus. $39); vol. 2, Biosynthesis (xii + 466 pp., illus. $24). Springer-Verlag, New York, 1967.

Antibiotics in Agriculture. Proceedings of the 5th symposium of the Group of European Nutritionists, Jouy-en-Josas, April 1966. J. C. Somogyi and A. C. François, Eds. Karger, Basel, 1968 (distributed in the United States by Phiebig, White Plains, N.Y.). viii + 208 pp., illus. Paper, $17.50.

Application of Physico-Chemical Methods in Chemical Analysis. Plenary lectures presented at a conference, Budapest, April 1966. International Union of Pure and Applied Chemistry in conjunction with the Hungarian Academy of Sciences and the Hungarian Chemical Society. Butterworths, London, 1967 (distributed in the United States by Plenum, New York). vi + 144 pp., illus. $10.

Applied Mathematics for Electronics. John H. Westlake and Gordon E. Noden. Prentice-Hall, Englewood Cliffs, N.J.,

(Continued on page 198)