and publish the results. This is an unusual arrangement which ought to have yielded an unusually detailed account of the critical and irreducible politics of weapons development. But the book depends a great deal upon material already published and on general assertions illustrated by a few specific examples briefly presented. It is not in fact an unusually fine-grained analysis.

There are limits, however, to the improvement that greater detail might bring. Ultimately the defects of the book are reasonably seen as defects in the state of the art of political analysis. Sapolsky does not try to advance the art in any theoretical dimension but rather seeks to use it to good advantage in analyzing the Polaris case. He does a creditable job of this, and makes a good case for the importance of politics. He leaves us wanting to know a great deal more about how politics actually works.

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Australia Antigen

Hepatitis-Associated Antigen and Viruses. A. J. ZUCKERMAN. North-Holland, Amsterdam, and Elsevier, New York, 1972. x, 222 pp., illus. $20.75.

Hepatitis-virus laboratory research appeared to be withering away in a perennially barren and desolate field until Blumberg planted Australia antigen at its periphery in the mid-1960's. Firmly established in its association with human hepatitis by 1968, the antigen suddenly flourished and quickly took over almost the entire field. This surge in hepatitis research spawned numerous meetings, the proceedings of many of which have been published as books or special issues of journals. Some of these publications have proved to be highly useful as collections of current references, particularly for readers already acquainted with the recent developments. With such an abundance at hand one might well ask if Zuckerman's new monograph is really necessary, since it covers much of the same territory. However, it is unique in its organization, breadth, and balance, and particularly in providing the perspective of a single author who has long been an active and regular contributor to many aspects of hepatitis research. This book should serve a much wider audience than any of its predecessors, including Zuckerman's own *Virus Diseases of the Liver*, which was published in 1970 just in time to catch the beginning of the antigen era.

For some potential readers, this new volume will appear to suffer from superficiality and brevity—a few chapters are disappointingly narrow or short—but most of the topics are presented in sufficient detail and with adequate references to satisfy even those well-established workers in one part of the field whose knowledge of the entire field may be limited. Its conciseness, clarity, and style make it specially suitable for the uninitiated reader who wants to gain relatively easy access to almost any of the multifarious activities in current hepatitis research. The author's familiarity with and understanding of the rapidly accumulating literature (published prior to March 1972) are apparent in his thorough coverage of generally accepted information as well as in his clear statements concerning controversial or unconfirmed reports, for example, on the "Milan" and fecal antigens purportedly related to infectious hepatitis (type A). However, the focus is quite properly on serum hepatitis (type B) and the increasingly recognized complexity of the little particles known as Australia (hepatitis-associated) or hepatitis B antigen. In general the illustrations, including numerous electron micrographs, are well chosen, clear, and helpful.

This book is perhaps best considered as a panoramic progress report. Undoubtedly it will call for a sequel within the next few years when, it is to be hoped, the "viruses" part of the title can take top billing.

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Zoonosis

Venezuelan Encephalitis. Proceedings of a workshop-symposium, Washington, D.C., Sept. 1971. Pan American Health Organization, Washington, D.C., 1972. xiv, 416 pp., illus. Paper, $5. PAHO Scientific Publication No. 243.

The designation of the conference on Venezuelan equine encephalitis (VEE) as a workshop-symposium reflects its two objectives: the comprehensive presentation of current knowledge concerning VEE; and an attempt to define future research needs, largely by free discussion among the more than 100 experts participating. Thus, the record of the discussion is a particularly important part of the proceedings, which are notable for their completeness and probable accuracy (typically, at PAHO conferences, transcripts of a discussant's extemporaneous comments are made available to him within 24 hours for verification and minor editing). The table of contents guides the reader to the formal papers and to the related discussion sections but, except for naming the invited discussants, leaves him on his own to unearth the frequent significant contributions made in the discussions.

The coverage is broad but, presumably reflecting the present state of knowledge, uneven; it ranges from ultrastructure and biochemistry of the virus (touched on lightly) through antigenic characteristics (well studied) and aspects of host-parasite interaction, for both vertebrate and invertebrate hosts, to epidemiology and control, which are extensively covered (five of eight sessions and 260 of 410 pages of text are devoted to these topics).

Except to dedicated arbovirologists, VEE virus heretofore has been an unimportant exotic agent. Its status changed sharply with the recent (1970–71) northward progression of epidemic equine disease and related disease in man from Central America through Mexico to Texas. In point of fact, the disease potential of VEE was evident long before its recent northward move. Extensive epidemics involving horses (hundreds of thousands, a mortality of 28 to 30 percent) and man (many thousands of cases and hundreds of deaths) have been recognized since 1935 in northern South America (chiefly Venezuela, Colombia, and Ecuador) and in Central America.

The story of VEE is unusually complex even for an arbovirus. There are several serologically distinct varieties, only certain of which (subtypes 1A, 1B, and 1C) are virulent for equines and associated with epidemics. Extensive enzootic areas are known, each with its characteristic variety of virus, none of which has been associated with epidemics. Indeed, the major unknown part of the story is the source (and reservoir) of the "epidemic" varieties. A range of vertebrate and invertebrate (mosquito) species can be infected, and both con-

tact and fomites transmission are possible. Equines seem essential to epidemic occurrence, however, although man-mosquito spread is possible. The chief hope for control lies in a live virus vaccine (TC 83), which appears to be safe for both man and horses. Its use to vaccinate several million horses is given much credit for containing the 1970–71 epidemic. The detailed presentation of this story is fragmented and often anecdotal but provides a wealth of information, both factual and methodologic, which will be of interest to medical entomologists and ecologists and other students of zoonotic disease. Fortunately for all readers, the story is admirably summarized in presentations by McKinney, by Chamberlain, and, most comprehensively, by Telford Work.

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Human Genetic Variation

The Biochemical Genetics of Man. D. J. H. BROCK and OLIVER MAYO, Eds. Academic Press, New York, 1972. xii, 726 pp., illus. $29.50.

It would be unfair to the contributors and editors of this volume if it were to be judged solely on the basis of achieving its stated aim, namely "to be comprehensive in approach both to the fact and theory of human biochemical genetics." No volume of 725 pages, or for that matter 7250 pages, could deal comprehensively with the facts of a field which has become as pervasive in current biomedical inquiry as biochemical genetics has. It is accomplishment enough that in its 14 chapters, coauthored by 15 contributors, this volume provides a more comprehensive framework for human biochemical genetics than has been available previously. I know of no other volume in which detailed accounts of blood group antigens, leukocyte antigens, and coagulation disorders are accompanied by descriptions of more "classic" biochemical genetic concepts such as protein polymorphisms and inborn errors of metabolism. Each chapter is thoroughly referenced and logically organized.

The book is divided into three sections: Genetic Basis of Variation (three chapters); Normal Variation (six chapters); and Pathological Variation (five chapters). This organization is valuable because it emphasizes the ubiquity of human genetic variation and because it demonstrates that mutation is not synonymous with disease. To its detriment as a textbook, however, this arbitrary separation of normal and pathologic variation means that the discussions of normal variation of hemoglobin or immunoglobulin structure, for example, are hundreds of pages removed from the description of disorders caused by pathologic variation of these proteins, the so-called hemoglobinopathies and immunoglobulinopathies. This dispersion of subject matter also magnifies the redundancy so characteristic of many-authored works. Thus, no fewer than four chapters concern themselves with protein and enzyme polymorphisms, a surfeit for even this important topic. The chapters entitled "Haemoglobin variation," "The immunoglobulinopathies," and "Unsolved Mendelian diseases" are particularly praiseworthy for their readable style, their informative tables, and their effective collation of large bodies of detailed and complex information. The textual material on inborn errors is necessarily brief, but the diversity of such conditions is emphasized by 17 tables which classify these disorders according to their biochemical bases.

The advanced student of biochemical genetics and investigators in this and related fields will find the volume an important reference and guide to further reading.

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Festschrift

Evolutionary Biology. Vol. 6. THEODOSIUS DOBZHANSKY, MAX K. HECHT, and WILLIAM C. STEERE, Eds. Appleton-Century-Crofts, New York, 1972. xvi, 446 pp., illus. $19.95.

This festschrift for George Gaylord Simpson is, unlike most festschrifts, almost worthy of its subject. There are only about four potboilers, three of them on man, and pomposity is otherwise restricted to the petrosal bone. Simpson's influence has been mainly by his writings (the dedication misleadingly implies that all his few students were invited to contribute), and several of the authors have been associated with Simpson mainly in this way. The subjects treated more or less represent current activity in evolutionary vertebrate zoology rather than the areas of Simpson's work.

A plausible argument could be made that evolution is the control of development by ecology. Oddly, neither area has figured importantly in evolutionary theory since Darwin, who contributed much to each. This is being slowly repaired for ecology, although the festschrift gives no evidence of it, but development is still severely neglected notwithstanding an interesting paper here by Gould on the evolution of growth in the coiled oyster *Gryphaea.* (Unfortunately Gould confuses growth with form, tightness of coiling with number of coils.)

Several other papers are also first-rate. Romer finally gives us his full analysis of the visceral-somatic dichotomy in vertebrate anatomy. He then uses this to treat the origin of vertebrates from the top down, so to speak, and makes an original and convincing story. McDowell makes a long and beautiful morphological analysis of a crucial aspect of the origin of snakes but flounders when he digresses to population ecology. Hoffstetter's now almost revolutionary thesis on an African origin for South American rodents and monkeys gets its longest treatment and its first in English. I think he is right but somewhat overstates the evidence. Lewontin finds genic diversity among human races to be only a tenth of that within single populations. He then ignores the phenotype, which is where adaptation comes in, and concludes that "human racial classification [has] no justification." His factual result may, however, be interpreted to mean that the special adaptations of human populations to different environments involve only a relatively small part of the genome.

The bibliography of Simpson's publications will be useful. In the very next paper, though, three paleontologists (no less) conclude that stratigraphic position is totally irrelevant to determination of phylogeny and almost say that no known taxon is derived from any other. I don't think Simpson will agree.

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