Gerontology: Sociological, Economic, and Medical Aspects

Advances in Gerontological Research. vol. 1. Bernard L. Strehler, Ed. Academic Press, New York, 1964. xii + 410 pp. Illus. $13.50.

Within the last decade the problems associated with aging have had an impact on the sociological, economic, and medical aspects of our nation's life to an extent never before realized. The scientific community has recognized the urgency of these problems and extensive research, here and abroad, is now underway. The technical difficulties involved in such research are so enormous that only with the most imaginative techniques, and the recent developments in instrumentation, have new advances been achieved. These very advances, with their highly specialized methodology, have created a further problem, that of communication. In addition to the compendium of information in volume 1 of *Advances in Gerontological Research*, the book also serves to establish a dialogue between scientists of diverse background and training who are concerned with a common problem.

In chapter 1, William Bondareff reviews much of the current knowledge of aging effects in the central nervous system. If we consider the importance of the nervous system and its uniqueness as a test system (for example, it is not regenerated throughout life as is the intestinal mucosa, or the skin) it is surprising that the understanding of the aging phenomenon in this tissue should be so sparse. Bondareff's review serves admirably to emphasize the necessity for further research in this area.

The proteins and protein metabolism associated with various phases of ontogenesis are discussed in chapters by Simion Oeriu and F. M. Sinex. An extensive documentation of protein biochemistry during aging precedes Oeriu's proposal that, to a considerable degree, senescence is a function of the accumulation of disulfide bonds. His evidence is impressive, and the implications of this thesis immediately suggest a host of promising avenues for further investigation. A different but complementary view of the mechanism of aging is that taken by F. Marott Sinex who emphasizes the significance of cross-linkages between the large molecules, especially with respect to the connective tissues, as a characteristic feature of the aging process. One of the significant aspects of this response is that agents which promote cross-linking may also interact with DNA or RNA and thereby contribute to the progressive disorganization of cellular function.

The nuclear changes during aging are considered by Warren Andrew who summarizes observations based on cells from a broad phylogenetic spectrum. Among the several changes that progress with senescence is the increasing frequency of internuclear inclusions. These apparently develop by an invagination of the nuclear membrane and eventually the closing off of the sac with its cytoplasmic contents to form the inclusion body.

Among the recognizable changes occurring on the cells of old animals is the accumulation of pigment particles —"age pigment" or "lipofuscin." In a concise but lucid chapter Sören Björkerud deals with the isolation and physical and chemical properties of the lipofuscin granules. In another chapter Bernard L. Strehler provides a comprehensive review of the histochemistry and ultrastructure of the age pigment in relationship to the aging process. This is illustrated by photomicrographs of excellent quality. A hypothesis for the possible origin of these granules is discussed, with implications that suggest areas for further investigation.

In a chapter dealing with the role of nucleic acids in aging, Zh. A. Medvedev develops the concept that the accumulation of noise, random disorganization of the genetic information, is the basis of the senescence. The thesis is supported by considerable data, and models are proposed for the possible mechanisms by which this noise develops in the genetic program of the cell. Disorganization of the genetic information may lead to the production of altered proteins. This is considered by Blumenthal and Berns who discuss the possibility that the degenerative changes which accompany aging are due, in part, to autoimmune reactions. Still another facet of this same broad generalization is treated by A. M. Clark in his consideration of genetic factors associated with aging. Of special interest is Clark's suggestion that modification of gene action rather than mutation in somatic cells is the critical factor in senescence.

In ionizing radiation the gerontologist has a unique tool, amenable to precise quantitation, by which those physiological changes that accompany aging may be induced at an earlier time than would be characteristic of the species. G. W. Casarett has examined these changes and subjected them to critical evaluation. From a comparison of the differences and similarities between radiological aging and chronological aging, he concludes that some, but not all, of the processes involved have a common pathogenesis.

In summary, the volume is timely, and although the arrangement of the chapters results in some sacrifice of continuity, the book is still readable. Strehler deserves much credit for his accomplishment in this ambitious book.

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Pacific Insects Monograph

Insects of Campbell Island (Pacific Insects Monograph, No. 7). J. Linsley Gressitt and collaborators. Bernice P. Bishop Museum, Honolulu, 1964. 663 pp. Illus. Paper, $9; cloth, $10.

The fauna of the sub-Antarctic islands south of New Zealand is of considerable interest to the zoogeographer and the evolutionist. On a series of collecting trips, Gressitt and his associates have done much to add to our knowledge of this fauna. More than 300 species of terrestrial arthropods (insects, mites, and the like), about half of them endemic, are now known from Campbell Island. The relationships are overwhelmingly with New Zealand and other nearby islands, particularly the Auckland Islands. The very high percentage of new species and even genera underscores once more how little of the fauna of our globe is as yet known. Would not the further exploration of the earth seem as urgent a task as the shooting of very expensive gadgets into space?

Campbell Island is the remainder of a volcanic area built up on an older platform. It was heavily glaciated during the Pleistocene, and much of its fauna arrived there since the end of the glaciation. The considerable number of flightless, and even wingless,

insects suggests exceedingly high rates of evolution, unless they were able to survive glaciation. The incomplete knowledge of the other sub-Antarctic islands and of the insect life of New Zealand itself does not yet permit final zoogeographic conclusions. The composition of the fauna suggests to me that all of it arrived by cross-oceanic dispersal, but Gressitt leaves the door open for the possibility that some of the elements are relicts of a formerly more widely spread fauna that occurred on a now submerged sub-Antarctic land mass which was connected with New Zealand.

In addition to the taxonomic accounts (pages 45 to 514, and pages 601 to 652) there are informative surveys of the climate, geography, geology, botany, and ecology of Campbell Island. There are interesting discussions on the evolution of winglessness, and most revealing reports on the capture of insects in continuously operating insect traps. The volume confirms the impression that the study of island faunas still yields interesting results, and we must be grateful to those who undertake such exploration in spite of the great hardships that are involved. The Bernice P. Bishop Museum is to be congratulated on the publication of this valuable series of monographs of Pacific insects.

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Reproduction, Water Metabolism, and Hibernation

Physiological Mammalogy. vol. 2, *Mammalian Reactions to Stressful Environments*. William V. Mayer and Richard G. Van Gelder, Eds. Academic Press, New York, 1965. xii + 326 pp. Illus. $11.50.

Unless a reviewer wishes to write something different and erudite, he can follow one of three courses: (i) he can describe the contents of the book and thus serve as a cataloger, (ii) he can read and comment on the book, its information, its ideas, its qualities, or (iii) he can talk about the book *he* thinks should have been written. I shall limit myself to the first two points and only raise a question in regard to the third alternative.

Although the first volume in this series was a disappointment to a physiologist (its title was *Mammalian Populations*), the present volume promises better. Its three chapters deal with reproduction, water metabolism, and hibernation, and each chapter is written by a competent and experienced author.

Because my knowledge of the vast literature on reproduction is limited and not very up-to-date, I was delighted to have an opportunity to catch up on recent developments in this interesting field. S. A. Asdell has produced a short chapter that is well written and well organized but, as far as I can judge, quite inadequate in its coverage. The reading was easy, but I found little information that seemed new and exciting; for example, information on implantation is practically absent, although this subject has been discussed in several symposia. When I looked for an evaluation of such interesting material as Sharman's studies of marsupial reproduction, I discovered that the entire bibliography has only one single reference dated later than 1959. Note that the book was published in 1965 and that the editors' preface (dated November 1964) states that "Volume III, upon which the Editors are currently working, will continue the same caliber of scholarly coverage. . . ."

The second chapter, "Water metabolism of mammals," deals with a subject that has seen a rapidly increasing activity in recent years, and one about which many other reviews have been written. Nevertheless, Robert Chew has produced a chapter which has a broad coverage and deals with much material that has not previously been brought together. It is presented in logical outline, detailed information is used to support generalizations, and many tables contain a wealth of compiled data with detailed references. This chapter makes interesting reading for anyone from the graduate student to the research worker in the field.

The third chapter, on hibernation, is the work of Charles Kayser (of Strasbourg), who has worked and published in this field for three decades. Within the allotted space, some 100 pages, Kayser gives an adequate review of hibernation, with an abundance of information included. In view of the many other excellent reviews of hibernation that have recently appeared, I am somewhat disappointed by the lack of emphasis on general principles in this particular one. There is a lack of clarity which perhaps is due to the inclusion of much old information, interesting but often of semianecdotal nature. It is not that more recent studies have been omitted, but rather that, in the overall picture, they do not have the place that they deserve as contributions toward the understanding of principles.

There was a time when the production of a book was difficult if the author resided abroad. However, this does not hold when by air mail France can be reached about as fast as California. It is therefore discouraging to find such glaring technical errors in this expensive book as the reappearance on page 238 (in identical form but with a different caption) of the graph first given on page 191. (Whether this is the fault of the author or publisher I do not know, but it is not the first time that this particular publisher has proved disappointing; last year the firm even published a figure that was clearly marked for deletion with a big cross in the proofs—that is, the wrong graph as well as the deleting cross appeared in the published volume—*The Red Blood Cell*, Academic Press, New York, 1964, p. 101).

I do not feel that a reviewer should venture into the third category of choices available to a reviewer and say how a book should have been written. However, I think it is legitimate for him to raise a question and ask *why* a book was published and what purpose it serves. This book does not live up to its title in that it covers but three specialized fields. Of the three chapters, one (on reproduction) is limited to generalities, and one (on hibernation) deals with a subject that for years has been reviewed and reviewed again. With long delays in publication, production errors, a misleading title, and only a minor part of the book constituting a contribution beyond other available treatments, why was the book published to begin with?

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