

been encountered. The next chapters concern the fabulous predacious fungi themselves and review some of the investigations which have been conducted to determine the distribution and mode of operation of these extraordinary organisms. The possible usefulness of these fungi for the biological control of nematodes becomes apparent during these chapters, and the last part of the book is devoted to an account of the limited attempts that have been made to apply these capabilities and to suggestions for future work.

After reading the description of them in this book, many readers will be tempted to have a look at predacious fungi for themselves, and yielding to this temptation is facilitated by two appendices. One appendix gives methods for obtaining and examining predacious fungi for those who have at their disposal the usual equipment for dealing with microorganisms; the other gives improvised methods which can be used by anyone who has a microscope as his only piece of scientific equipment.

The book should appeal to anyone who is interested in living things. Not only are the predacious fungi of great inherent interest, but the ecological problems touched upon and, indeed, the whole matter of biological control are of very general concern. Moreover, the book is not written for the specialist; in fact, its style is an excellent example of semi-popular scientific writing, because it is straightforward and avoids unnecessary terminology without sacrificing accuracy or being condescending. It is to be hoped that the book will find its way not only to the shelves of mycologists but also into the hands of high-school students and college undergraduates who are casting about for reading to supplement a course or for a subject for a research project, because such students will find *The Friendly Fungi* instructive and stimulating, just as the specialist will find it delightful.

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The Life of Mammals. J. Z. Young. Oxford University Press, New York, 1957. xv + 820 pp. Illus. \$10.

J. Z. Young has already devoted 200 pages to the origin, evolution, classification, and ways of life of mammals in his *The Life of Vertebrates* (1950). This companion volume was constructed from the essentials of mammalian gross anatomy, histology, physiology, and embryology, smoothly fashioned into an account of what it takes to keep mammals alive as individuals and to perpetuate them as species. It is intended as a text

for premedical students, but it could be read with enjoyment by any biologist and deserves wide notice as an example of a relatively new pattern of thinking about living matter.

Biology, says Young, must free itself from the limitations of an outmoded language. The uniquely biological properties of living matter cannot be described properly in terms now available, but as a step in the right direction he suggests the developing language of information theory. He sprinkles his text with terms like *feedback*, *servomechanisms*, *control systems*, *signals*, *sets of instructions*, *coding* and *representation*.

A mammal (or an ameba) is distinct from its environment yet continually makes interchanges with it and can survive only by containing within itself stores of information which represent what its environment has been in the past, and through which it can calculate what the environment will probably be in the future. Then it must be patterned so that it will select one of the alternatives of behavior which will be permitted by the environment. Part of the store of information (for which the word *memory* is freely used) is printed into the genes, the rest being garnered and stored here and there during the life of the individual. All cells, all tissues, exist in a state of "double dependence," becoming patterned or controlled by these two stores of information, whether in the maintenance of a homeostatic economy or in the production of a new one. It is urged throughout the book that such a choice of metaphor is unifying and fruitful in the coordinating of knowledge of such different disciplines as gross anatomy and biochemistry. Young suggests that suitable terms for describing fore-brain functions will presumably evolve as men make machines that imitate these complicated actions more closely.

However, this is far from being a tract for philosophers. The gross anatomy of mammals is covered in detail quite sufficient for the premedical student, the rabbit being chosen as type. Skeleton, muscles, and nerves are considered as functional units for support and locomotion. There are solid traditional approaches to the subjects of digestion, respiration, endocrinology, and so on. The concept of homeostasis is examined from many angles. Chapters are devoted to the body fluids, to the sensory systems, to the functions of the central nervous system, and to recent advances in muscle and nerve physiology. Fourteen of the 47 chapters deal with embryology, and six of these constitute the principal departure from mammalian biology, presenting experimental embryology pertaining to amphibians and birds.

To the credit of the author and his style, and by virtue of his selection from

what, even to him, must have seemed an endless range of available knowledge, there comes out clearly in this book a sense of the staggering intricacy, and the almost unbearably beautiful fitness, of the parts of living things.

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The Physiology of Fishes. vol. II, *Behavior*. Margaret E. Brown, Ed. Academic Press, New York, 1957. xi + 526 pp. Illus. \$14.

Volume I (*Metabolism*) of *The Physiology of Fishes* was reviewed in the 8 Nov. 1957 issue of *Science* [126, 981 (1957)]. Happily, only a short interval elapsed before the appearance of volume II (*Behavior*). Perhaps it is a sufficient commentary on the state of our knowledge of fish physiology that the second volume is the larger of the two and, in that sense, represents a triumph for the students of behavior. So important has their use of fishes as experimental animals become, and so much does it promise, that whole fields of classical physiology may be thought of as tools for the study of behavior.

Treatment of these tools makes up about 60 percent of the volume, the largest single section being that on the nervous system, by E. G. Healey. The group of chapters on conditioning (H. O. Bull), ethology (G. P. Baerends), and reproductive behavior (L. R. Aronson) constitutes less than another 20 percent, as do the chapters on the eye (J. R. Brett), the acousticolateralis system (O. Lowenstein), and the olfactory and gustatory senses (A. D. Hasler).

To this core is added a group of chapters on the structures that are unique, or almost so, to the fish: the swimbladder, by F. R. Harden Jones; the electric organs, by R. D. Keynes; and the luminous organs by E. Newton Harvey. Each of these authors is able to present a considerable body of work published since 1950. The next two very brief chapters, on the pigments (D. L. Fox) and color changes (J. M. Odiorne), present relatively little new work but draw together the material relative to fish. The chapter on the quality of water required by fish, by P. Doudoroff, might almost be entitled "pitfalls in conducting experiments with fish." The book concludes with a useful review of the physiological genetics of fish, by M. Gordon.

The choice of contributors to volume I was rated as outstanding; the high standard has certainly been maintained in volume II. With minor exceptions, each chapter was contributed by an active worker, usually one whose own contributions to the field in question have

been notable. Only through such joint authorship could so authoritative a volume have been produced. There is no common index, and cross references are few. Nevertheless, owners of volume I will certainly wish to own volume II, and members of the new group who have been led, because of special interests, to purchase volume II, will soon find a strong compulsion to make their sets complete.

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Veterinary Toxicology. Formerly *Lander's Veterinary Toxicology*. R. J. Garner. Bailliere, Tindall and Cox, London, 1957 (order from Williams & Wilkins, Baltimore). 415 pp. \$7.50.

This unillustrated book deals with a study of the origin, properties, and effects of poisons, with their detection, and with the treatment of their effects. This is a complete revision of the third edition of *Lander's Veterinary Toxicology*, as revised by Nicholson, which was published in 1945. The new author, Garner, refers to Nicholson very frequently in the voluminous references, for which, as the book shows, Garner has done an enormous amount of research. Much of the original text has been rewritten and rearranged. The botanical description and illustrations of plants have been deleted from the section on poisonous plants. Newer subjects, such as chemical pesticides and radioactive substances, have been added and given proper consideration and importance by the devotion of a section to each. The data on chemical analysis for poisons have been brought together in another section.

There is much documented evidence, with references, to support what the author says, and it is well arranged. There is a good index, which makes the book valuable as a ready reference. Although considerable space is very appropriately devoted to the toxicology of both chlorinated hydrocarbon and organic phosphorus insecticides, it does not seem as though the list of references is correspondingly long, and I believe that the U.S. Department of Agriculture's *Technical Bulletin 1122* on these subjects is worthy of reference. In the section on poisonous plants there is no mention of greasewood and halogeton, two oxalic acid plants, or of milkweed and locoweed, all of which have received considerable publicity in American literature. There also is little information given about a number of poisonous plants important in the United States, such as larkspur, arrow grass, fescue, and astragalus. However, the book brings to-

gether a wealth of information, arranged in such a way that it is easy to find. Moreover, a book on this subject has been urgently needed. In the changing field of agricultural chemicals, with new chemicals reaching the farms, the animals, and the animal feeds, veterinary toxicological problems may appear or be suspected in connection with numerous agricultural practices. Veterinarians, research workers, students, and others interested in toxicology will find this book of value.

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On the Utility of Medical History. Monograph I, Institute on Social and Historical Medicine, New York Academy of Medicine. Iago Galdston, Ed. International Universities Press, New York, 1957. ix + 73 pp. \$2.

Iago Galdston, one of the country's most articulate promoters of the writing of medical history, has written or edited many volumes dealing with current medical issues in which the historical background is fully set forth because he believes that medical history, by illuminating the present, provides a basis for judgment about the future. To inquire whether this belief is well founded and, if it is, how the potential utility of medical history may be more fully exploited, he organized the conference or institute reported in this book. Other contributors besides himself are George Rosen, Owsei Temkin, Gregory Zilboorg, Erwin H. Ackerknecht, and Paul Schrecker. In a series of essays they define and discuss purposes, values, goals, and uses of medical historiography, teaching of medical history, and medical history itself.

After finishing the essays, my first reaction was to write a review article on the utility of medical history, exploring the distinction between the *value* of history studied for itself and the *utility* of history as an aid to solving current problems—reasserting the cultural and humane values in history which the essayists seem reluctant to expound and urging medical historians in search of self-justification to admit their interest in the subject for its own sake and to say less of the utility of medical history, which cannot be proved, lest they promise more than they can produce. Lacking space, I set my essay aside unfinished. But the reader may judge from this how thought-provoking I found the book.

Although the uses of history in general have been discussed more fully by a number of other historians, and although earlier articles by Temkin,

Rosen, and Ackerknecht on the usefulness of medical history and its role in medical education are as good as if not better than their contributions here, anyone who is particularly interested in medical history may gain new insights from these stimulating essays. The book's chief value, however, will be realized if it is able to reach and influence the unconverted who can profit from it most. If it does, it will have performed a useful function.

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Metabolic Aspects of Transport Across Cell Membranes. Q. R. Murphy, Ed. University of Wisconsin Press, Madison, 1957. xxiv + 379 pp. Illus. \$7.50.

Movement of substances across the boundaries of living cells is obviously necessary for their continued existence. In recent times it has become apparent that some substances do not always move simply down concentration gradients or gradients of chemical or electrochemical potential; that there are net movements against such gradients is now indeed a well-established fact. Elucidation of the mechanism underlying this type of transport and the way in which it is coupled to required energy sources is the current goal of much physiological research and is the central topic of this book.

The volume contains the reports and discussions of a symposium held at the University of Wisconsin in August 1955. Brief specific mention of the principal topics will indicate the scope of the subject matter: regulation in fluid exchange (E. F. Adolph); ion exchange in clinical medicine (D. C. Darrow); principles and theories of transport (H. H. Ussing); movement of water and electrolyte across intestinal epithelia (M. B. Visscher); transport of ions in skeletal muscle (E. J. Conway), in cardiac tissues (S. Weidmann), in vertebrate nerve (A. M. Shanes), in renal tubules (R. W. Berliner); gastric acid secretion—the present position (R. E. Davies); gastric acid secretion—metabolic aspects (H. W. Davenport); and gastric acid secretion—compatibility of theories with electrophysiological findings (W. S. Rehm and W. H. Dennis). Additional brief reports preface each discussion.

Areas of discussion are: (i) ion transport in muscle and nerve, (ii) ion transport across renal epithelium, (iii) transport of organic compounds across renal epithelium, (iv) gastric acid secretion, and (v) correlation of clinical problems and basic information relating to membrane transport. Transport in plant cells is not considered.