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 appendixes. 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 semipopular 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.

ROBERT M. PAGE
Department of Biological Sciences, Stanford University

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 forebrain 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.

W. W. BALLARD
Department of Zoology, Dartmouth College

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