Book Reviews

Biologist and Generalist

Memories. JULIAN HUXLEY. Harper and Row, New York, 1971. 296 pp., illus. $8.95.

Julian (Sorell) Huxley was born in the house of his Aunt Mary in London on the night of 22 June 1887. The present volume, first installment of an autobiography, begins well before that date with his grandfathers Thomas Henry Huxley and Tom Arnold and extends through the year 1945. When he was four years old, and incidentally could already read and write, Julian's paternal grandfather wrote to him saying, "When you grow up I dare say you will be one of the great-deal seers and see things more wonderful than Water Babies where other folks can see nothing." Now in retrospect Sir Julian (as he has become) writes, "If I am to be remembered, I hope it will not be primarily for my specialized scientific work, but as a generalist; one to whom, enlarging Terence's words, nothing human, and nothing in external nature, was alien." Here is ample evidence that his grandfather's prediction has been fulfilled and his own aim will be achieved.

Sir Julian writes his own life history as clearly, as dispassionately, and as straightforwardly as he might write that of a member of some other species. Whether he is writing of his triumphs or of episodes that lesser men would try to eliminate from their annals, he neither evades nor overemphasizes. His disastrous first affair is here, censored only by gentlemanly reduction of the lady's name to an initial, but here, too, is his ideal, enduring marriage with Juliette Baillot. The eventual fiasco at the London zoo is here, but it is put in decent perspective and is a negative accent in a series of almost unbroken positive accomplishments.

The sequence is illustrative of the formation and fulfillment of a great biologist: Eton, Oxford, the Marine Biological Station at Naples, Oxford again and Tring (this was the period of the now classic, then germinal study of the courtship of the great crested grebe), Rice Institute in Houston, work with Warburg and Hartwig in Germany, back to Rice but a final break there, the Kaiser's war, and then to Oxford again. All the time he was doing something in experimental biology, more as a generalist (*Religion without Revelation* was published in 1927), and most as the forerunner of present-day ethology in the study of noncaptive birds. In 1929 came his first trip to Africa, which has continued to be one of his main concerns and sources of inspiration to this day. *Problems of Relative Growth*, another truly seminal work, was published in 1932. In 1935 he took over as Secretary of the Zoological Society, which meant managing or overseeing its many affairs including the London Zoo, and it was during his years there that he wrote *Evolution, the Modern Synthesis*, published in 1942, just after he left (indeed was ousted from) that position. War had come again, and Huxley played an important, noncombatant role partly in England and partly in Africa.

After the account in this volume ends, the years with Unesco and much, much more were to follow. Sir Julian is now engaged in writing the sequel, and all readers of this fascinating volume will look forward to it.

The index consists almost entirely of names, and this brings out the fact that Sir Julian has known so many interesting people and that he writes about them as well as about himself. Yet the index would be more useful if it also helped to locate events and places. The text of the American edition is identical down to the smallest serif with the English original published last year by Allen and Unwin. One difference is that the American edition costs $1.35 more.

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Aquatic Invertebrates

Bryozoans. J. S. RYLAND. Hutchinson University Library, London, 1970, and Humanities Press, New York, 1971. 176 pp., illus. Cloth, $5; paper, $2.50.

In this little book Ryland does not attempt "to guide . . . bryozoologists in their own specialty," directing his attention instead to outsiders, zoologists in other fields, and university students. But the book will almost certainly influence the study of Bryozoa for some time.

For one thing, the book is broad in its coverage. All the major groups are considered and discussed in relation to one another. Perhaps a quarter of the book is devoted to fossils, with emphasis on Paleozoic and Mesozoic stenolaemates. The study of Bryozoa has traditionally been like that of most animal groups; paleontologists, especially pre-Tertiary paleontologists, have largely ignored the work of neontologists, and neontologists have shamefully neglected the splendid literature on fossil forms. Ryland crosses this artificial gap and discusses paleozoic bryozoan anatomy and biology by comparing fossil skeletal parts with those of modern forms. The result is so successful, and the presentation so informative, that I doubt there is any working bryozoan specialist who will not benefit substantially from reading this section. The coverage of freshwater bryozoans, the Phylactolaemata, is disappointingly brief, but still surprisingly comprehensive. The dominant Recent Bryozoa, the Cheilostomata and Ctenostomata, receive the most thorough coverage. Here the author strikes a healthy balance between morphology and taxonomy on the one hand and ecology and physiology on the other. The chapter on ecology is particularly fine.

Both bryozoan specialists and general zoologists will find the references, which are well chosen, particularly useful. The figures are of good quality and are frequent enough that the text does not become abstract, but the book would benefit from more illustration, particularly a few photographs. A disturbing feature of the book is that the author does not always distinguish between matters that are comparatively well established and ones that are still controversial. For example, he presents a classification of the Cheilostomata in a matter-of-fact way that obscures the fact that he is introducing new arrangement of taxa. Two of his taxa ("divi-

sions" Gymnocystidea and Ascophora) are in fact so novel in content that they amount to new orders. Some terms introduced in the chapter on stenolaemates—"coelocyst," "eustegal," "colonial epithelium," and others—are set down without a hint that they are altogether new. These sections seem to have been directed more toward the author's colleagues than toward the student and general zoologist, for whom a more conservative approach would have been desirable.

The book comes attractively bound and happily low priced. This situation will no doubt speed its dispersal to its intended audience. I hope so; these interesting and important little animals deserve more attention.

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A Key Biological System

The Lactose Operon. JONATHAN R. BECKWITH and DAVID ZIPSER, Eds. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1970. x, 438 pp., illus. $12.

This useful and distinguished volume, organized as 10 review chapters and 16 research articles, resulted from a conference on the *lac* system held at Cold Spring Harbor in September 1969. As the editors point out, the lactose operon of *Escherichia coli* clearly is one of those key biological systems on which much of the development of molecular biology has depended. The publication of the book comes nearly a decade after the announcement of the operon concept by Jacob and Monod (who wrote the introduction) and some 25 years after the pioneer work of Monod on enzymatic adaptation. The book constitutes an eloquent statement of the progress made since those early days.

Genetic aspects of the *lac* system are stressed throughout the book. A general review features diploid analysis, deletion mapping, and uses of transducing phages and fusion strains. A broad spectrum of mutants is described. The enzymes specified by *lac* genes, betagalactosidase and thiogalactoside transacetylase, are characterized in terms of isolation, composition, subunit structure, isoenzymes, complementation, and immunological properties, as well as various features of enzymatic activity. The normal *lac* repressor and several mutant repressors, including superrepressors, are treated. The *lac* permease system is reviewed thoroughly. It is suggested that the name "permease" be reserved for the entire transport system rather than for an individual protein component. Specific messenger RNA and its formation are covered, with emphasis on kinetics, polarity, and transcription starts and stops. Translational punctuation and polarity and the effects of deletion of translational start signals are likewise considered. A DNA-directed cell-free system for betagalactosidase synthesis that has a variety of experimental potentialities is reported. Catabolite repression and effects of cyclic adenosine monophosphate receive their share of thoughtful attention.

Appropriately, this volume by and large is written in the style of the experimentalist, and it goes a long way toward documenting the influential role that the *lac* system has played in the exploration of the cell's informational macromolecules. This system has no doubt contributed much to the *E. coli*'s-eye view that many life scientists have of molecular biology. And *lac* is estimated to represent only 0.15 percent of the *E. coli* chromosome! It is clear that a highly successful extrapolation has occurred. By the same token, there is of course the danger of overgeneralization. Is action at the gene the only mode of regulation of protein synthesis? Is the *E. coli* operon, with its high degree of clustering of functionally related genes, characteristic of the organization of all genetic material?

This note of caution notwithstanding, the stimulating contributions do bear out what is stated in the introduction, namely, that "the *lac* system is as yet far from having lost all its charm and mysteries" and that much "remains to be learned from bacteria." Thus, coupled with a reference to the enthusiasm with which a number of molecular biologists "are abandoning K12 for BALB C or some other mammal, such as a nematode," is the apt reminder that "there is always 'room at the bottom.'"

All in all, this book recommends itself as a very authoritative and readable source of information for anyone interested in macromolecular biosynthesis and its regulation.

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Neurochemistry

Protein Metabolism of the Nervous System. A symposium, New York, April 1968. ABEL LAJTHA, Ed. Plenum, New York, 1970. xxii, 732 pp. illus. $45.

This is an ably organized tome on a process pivotal to cellular existence in general and to neural response in particular. Its 38 chapters (by 67 contributors) are grouped into four sections.

In the section Metabolism Related to Turnover, S. Roberts considers characteristics of cytoplasmic ribosomes derived from neural tissue. The problem of ribosomal research is unbelievably complex, particularly if one is to translate from findings in vitro to actual events in the cell. The salient observations in this chapter relate to the unusual instability of cerebral neuronal polyribosomes at low magnesium concentrations or in the presence of pancreatic ribonuclease. Cerebral ribosomes appear to be unusually responsive to polyuridylic acid in stimulating incorporation of amino acids. M. R. V. Murthy's studies deal with the separation of membrane-bound and "free" ribosomes of rat brains as a function of development. He finds that membrane-attached ribosomes are largely polysomal and more resistant to degrading agents than the "free" polysomes. This may be due to multicomponent association of the membrane, messenger RNA, and the *de novo* polypeptide. Most of the observations in this paper are offered in support of the idea that membrane-bound ribosomes are responsible for secreted protein while "free" ribosomes synthesize proteins for intracellular uses. B. D'Monte, N. Marks, R. K. Datta, and A. Lajtha examine protein turnover in mitochondrial subfractions with respect to proteinase and aminopeptidase content, incorporation of amino acids into membrane proteins, and protein composition of submitochondrial fragments. Study of the outer membranes shows localization of aminopeptidase. The authors justifiably take a cautious approach to interpreting from "marker" enzymes. Their succinct discussion of these enzymes reveals the unsatisfactoriness of findings in this area.

The significance of protein breakdown as a regulatory mechanism is further elaborated by N. Marks and A. Lajtha and by A. V. Palladin and Ya. V. Belik. Work on insoluble proteins of the synaptic plasma membranes (SPM) is described by H. R. Mahler and C.