

nology, and insect biology should find it valuable.

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## EVOLUTION'S MIXED BAG

**Process and Pattern in Evolution.** Charlotte J. Avers. Oxford University Press, New York, 1989. 590 pp., illus. \$35.50 (ISBN 0-19505-2757 cloth), \$19.95 (ISBN 0-19506-1055 paper).

This general evolution text is suitable for undergraduates with a background in genetics and organic chemistry. The first of three main sections, "Foundations of Life on Earth," covers the history of evolutionary ideas, the origin of the universe and solar systems, the origin of primeval life, and a general discussion of the biotic evolutionary tree. The second section,

"Evolutionary Processes," includes genetic diversity, natural selection, adaptation, population genetics, and speciation. Finally, in the third section, "Patterns and Trends in Evolution," the author treats phylogenetic analysis, the fossil record, extinction, origin and evolution of primates, and human evolution.

Thus a broad scope of topics is covered in their standard order, pretty much as they are covered in many other texts: lots of basic ideas and basic vocabulary, and that is of course good. On the other hand, the book itself is not very critical. Avers traverses a pathway right down the middle, choosing to present a balanced approach. Many teachers will like this avenue, and it is not altogether inappropriate for a general text. Personally, however, I would have liked the author to be more critical about what we think we know; how else are students going to learn to judge and evaluate? Books of this sort should teach students how to ask questions, and therefore must

present problems and conflicts.

Many of the chapters are perfunctory and read like any other introductory evolution book on the market. The chapter on speciation is a good example. We are given the standard litany of the biological species concept as the "most widely accepted modern definition," which is not true within contemporary systematic biology (Avers does not mention the raging controversies on the topic of what comprises a species that have taken place in the last decade). Then we run into discussions of sibling species, subspecies, allopatric speciation (Galapagos finches again), and punctuated equilibrium. Again, a host of controversies and unresolved problems are not mentioned. This omission might be acceptable if the text were aimed at nonmajors, but this book is not—it is too big and detailed. So biology majors are missing the action.

As a systematist, one of the things that bothered me most was the almost total disregard for all the new infor-

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ISSN 0141-0229

Published Monthly

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mation that we have gathered in the last two decades about the phylogenetic relationships of the major groups of organisms. Virtually none of this information is incorporated into the discussions of the origin and early evolution of life, the fossil record, and speciation, a deficiency that makes the book woefully out of date.

This book is a mixed bag. It covers a broad range of subjects, but many inadequately. It appears strongest in the sections dealing with genetics, development, and the molecular aspects of evolution. The major faults of this book are not its alone but are shared by other textbooks attempting to summarize the vast amount of information comprising evolutionary biology. Thus, despite my somewhat negative tone, Avers' book compares favorably with other available texts. The problem is that all these books attempt to be encyclopedic, and I am not convinced that this is the best way to convey the excitement and intellectual challenge presented by this discipline.

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## NEURAL INDIVIDUALS

**The Remembered Present: A Biological Theory of Consciousness.** Gerald M. Edelman. Basic Books, New York, 1989. 346 pp., illus. \$29.95 (ISBN 0-465-06910-X cloth).

As their careers mature, many successful scientists turn to the study of the highest brain functions, to consciousness. A. Einstein, J. C. Eccles, D. O. Hebb, W. Penfield, and more recently Penrose and F. H. C. Crick, are all examples. Gerald M. Edelman is also taking his turn. Yet, poignantly, it is for them to suggest, to dream, and for us the younger scientists to know, many years hence, from our experiences and experiments. For it is clear that consciousness is not yet a solved problem.

In that spirit, I would like to consider Gerald Edelman's book, *The Remembered Present: A Biological*

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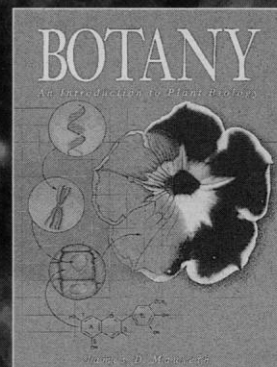
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*Theory of Consciousness*, the "last in a trilogy" (following *Topobiology* and *Neural Darwinism*). What can be learned from this book? How might it influence experimental studies on perception, consciousness, and motor function? How does it stand as a full theory of consciousness? This last book is an attempt at a major synthesis to create a theory, a testable theory, and to create a book with many ideas, some new and some old, for us younger scientists to discuss and ponder.

Edelman draws on information gleaned not from his own experiments on brains, but from those of others, through an extensive reading of a vast literature, and through meetings sponsored by the Neurosciences Institute. Edelman intelligently integrates this information in *The Remembered Present*. Throughout his presentation, Edelman relies heavily on an important biological principle taken from his other life as an immunologist, the principle of selection. In immunology, the principle of selection is applied to the choice of a

genetically predetermined subpopulation of white blood cells. These cells express the antibody to match a foreign antigen. This selection allows our immune systems to respond specifically in the future to any one of a plethora of inputs.

In the brain, Edelman proposes that a population of neurons is selected to solve a particular information-processing challenge out of a large number of possibilities. Using this selection principle and a form of feedback called reentry (the sending of the state of neural tissue to other cortices), Edelman presents a synthetic model of brain function and suggests solutions to major questions about mental functions that have stood for many years (e.g., optical illusions, temporal constancy, value systems, and neurological deficits).

Edelman uses two main constraints to guide his theory on higher mental function: that there are no pre-existing categorizations of the stimuli of the external world and that individual brains have enormous variability. He argues that these concepts stem from