

37 "prosporus" occurs for "prosurus." Color photographs throughout the book are too small, and opposite page 302 a caption for a lichen illustration directs the reader to "note the black apothecia" which are not visible.

The content satisfies the objectives described in the preface. This textbook would support a course between an introductory principles course and the advanced morphology courses ordinarily offered at the graduate level. The laboratory aspect of any such course would, of course, need to be strongly emphasized. For curricula designed as Haynes envisions, the subjects in this book would be useful content for secondary teachers and botanists.

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Cell and Molecular Biology

THE LIVES OF A CELL: NOTES OF A BIOLOGY WATCHER, by Lewis Thomas. 1974. Viking Press (625 Madison Ave., New York 10022). 148 p. \$6.95.

Thomas Jefferson may be alive and well and frequenting the New Haven-New York area. Only a DNA-print would reveal whether Lewis Thomas is an alias or an intellectual look-alike. The "brainpower" tribute of JFK to our third president could well be made for the author of this work. Thomas' book reflects the genius of one man, who, like Jefferson is as broad as he is deep.

The book, a collection of short essays which first appeared in the *New England Journal of Medicine*, can be read in several hours, but the reader will want to return again and again to savor the subtle imagery of Thomas' thought. It is destined to become a classic for the biological generalist, the evolutionist, the ecologist. Thomas has organized and synthesized much of the contemporary material from several disciplines including anthropology, microbiology, cytology, ethology, and genetics. The result is a story of freshness and simplicity that is as unique as one of its leading characters, the termite symbiote, *Myxotricha paradoxa*.

Thomas' writing style projects an image of a warm, compassionate, optimistic human being—one awed by the complexity that is man and the countless thousands of other species that make up the "membrane" of life which covers this planet. Thomas is humbled by the realization that his identity may not be what he supposes it to be, for his cells are "occupied" by possible endosymbionts, the mitochondria, centrioles and perhaps others. "I had never bargained on descent from single cells without nuclei . . . There is additional humiliation that I have not, in a real

sense, descended at all. I have brought them all along with me, or perhaps they have brought me."

Thomas feels that basic biomedical research will provide the foundation for advances in those areas where "effective" and efficient medical technology is not present. He very cleverly distinguishes between applied and basic science and points out that the former is only possible after a thorough understanding of the latter. Thus, basic biological research appears to be the first step in the elimination of incurable diseases and "halfway technology."

Biofeedback, the recent "break-through" in experimental psychology, is met with much reservation by Thomas. He feels it is not in keeping with a "return to nature," and implies that such control may lead to serious problems of the fumbling type associated with practiced skills. Jokingly, he suggests the exact opposite—a complete let go. This, he contends, would be in accord with becoming part of our ecosphere rather than manager of it.

Thomas' etymology is superb. He sees syntax as an innate elaboration of our linguistic genome—something which separates us from other animal species. Ambiguity is seen as desirable, even necessary, since it provides us with the straying power to drift away—up, up, and away. Thomas views language as endowed with a life of its own and as any life form, always changing.

It has been about 200 years since Jefferson penned our Declaration of Independence. Lewis Thomas' essays may represent an equally eloquent Declaration of Interdependence for our ecosphere. The pieces of Nature's jigsaw puzzle, past and present, have been increasingly joined so that a picture is emerging—that of a ecological-evolutionary unity among all life on earth.

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Ecology and Environmental Biology

ON DEFUSING THE POPULATION BOMB, by Michael Endres. 1975. Halsted Press (605 Third Ave., New York 10016). 191 p. \$10.00 hardback, \$5.00 softback.

The author of this volume has attacked a problem of heroic proportions. While the presentation is adequate, it fails to come up to the expectations generated by the title. It lacks, for example, the flair and grace of Paul Ehrlich's *The Population Bomb*—its logical antecedent. For this reason, it seems unlikely to produce an enthusiastic readership despite the several important insights brought to bear.

The book seems most appropriate as supplementary reading for college level

social science courses. The first three chapters outline various aspects of the problem of population growth and continue with an historical review of population theory. The piece on Malthus is excellent, probing his writings in depth and going far beyond the popularized notion of this man as doomsayer prophet. In addition, the organization into natural theories of population vs. socio-cultural approaches and the accompanying discussion is illuminating in that it opens the field to a much wider array of social commentary. The section "Karl Marx on Population" is a good example.

Chapters 4-10 lay the groundwork and present the author's main thesis: that massive increments in life expectancy will make an emphasis on fertility control less than adequate in dealing with population-related problems. The author is not a biologist and draws primarily from known authorities in medical research for support. Unfortunately, the Buckminster Fuller-like musings frequently cited are poor substitutes for documented research results.

The basic fault with this book lies in the author's style. Redundancies are abundant—notably where arguments from previous chapters are cited and rephrased without adding to the discussion. The reader is forced into a pattern of skimming and then rereading for significant ideas. Along with heavy and convoluted wording and frequent digressions, this tends to disrupt the smooth flow of ideas throughout the book.

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Educational and Professional Concerns

SCIENCE FOR THE ELEMENTARY SCHOOL, by Edward Victor. 3rd ed., 1975. Macmillan Co. (866 Third Ave., New York 10022). 744 p. \$12.95 hardback.

This is a book of methods and materials designed especially for the elementary school science teacher. It strikes a nice balance between the biological, chemical, and physical sciences, at times separating them but also interrelating where appropriate. The initial chapters seem more suited for the beginner or less experienced teacher who is concerned with planning, sample teaching units, and objectives relating to teaching science in the elementary school. Some areas, such as the topics relating to various psychological theories including Piaget's, are applicable for more experienced teachers. The overall strength of the text relates to the basic science information section, which provides a mixture of ac-

tivities, references, and subject matter of benefit to both the beginning and experienced teacher. Some of the photographs could be more modern but the line drawings relating to activities and experimental "set ups" are clear and numerous. Topics discussed in this section include the universe, earth, climate, travel, planets, animals, the human body, matter-energy relationship, machines, fuels, light, sound, magnetism, and electricity. Nuclear energy and radioactivity are included in the information. The whole book and especially the basic science information areas are indexed. The appendix includes only pictures of common laboratory equipment but could have been expanded to include other often used data. Nice use is made of the inside cover pages in both the front and rear of the book where metric and English equivalents are printed.

In general, this book, traditional in nature with modern entries, is more than adequate as a textbook for training elementary science teachers and should serve readily as a desk reference for experienced teachers.

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Evolution

STRUCTURE AND EVOLUTION OF VERTEBRATES: A LABORATORY TEXT FOR COMPARATIVE VERTEBRATE ANATOMY, by Alan Feduccia. 1975. W. W. Norton (500 Fifth Ave., New York 10036). 176 p. \$6.95.

This manual provides an excellent alternative to the classical comparative anatomy laboratory: a presentation of the major features of the morphological evolution of the vertebrates without reams of minute detail. Through the laboratory work the students are able to follow the development of general trends of evolution as displayed in anatomical characteristics; they are allowed an overall picture of vertebrate evolution unclouded by a maze of trivial memorization. Feduccia's intent is to present a general picture, and he does this quite well.

There are numerous other points in the book's favor. Important terms are in bold type and are defined upon their first appearance. Illustrations throughout the book are uncluttered and clearly labeled. There is an appendix of terms used in dissection and an excellent diagram illustrating anatomical planes and directions. A second appendix contains a brief classification of the vertebrates. The book also has a good list of references and a comprehensive index.

I found two shortcomings in this lab manual. First, the dissection instructions are too brief. Feduccia says this is

to allow students the freedom to develop their own methodology. This is fine, but students need some general suggestion as to where to cut and what to remove—more procedural guidance than the book gives. Second, the descriptive text and accompanying illustrations are frequently on different pages. This requires a lot of disruptive page flipping while trying to do the dissection.

Feduccia does present a viable alternative to the classical comparative anatomy lab, one that would be most useful for presenting a course on the general trends of vertebrate anatomical evolution.

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BIOLOGY: EVOLUTION AND ADAPTATION TO THE ENVIRONMENT, by Mahlon G. Kelly and J. C. McGrath. 1975. Houghton Mifflin Co. (110 Tremont St., Boston 02107). 567 p. \$12.95 hardback.

This is a well written, clearly illustrated general biology book suitable for use with introductory college nonmajor biology classes and with upper level high school biology students. Because of the clear coverage of population growth, competition, and community energetics, this book would also be a useful resource for most high school libraries.

The book is a very creative attempt to introduce students to evolution as an explanatory tool in biological thought. The book first covers the mechanisms of evolution, then briefly examines aquatic, terrestrial, and physiological adaptations. This takes the place of the phylogenetic survey and organ system overview of the more traditional biology textbook. Next, genetics, population genetics, and speciation are covered, followed by a brief introduction to cellular chemistry, energy, photosynthesis, and respiration. This material is used as the transition into ecosystems, biogeochemical cycles, and nutrient flows. Well illustrated chapters on population growth, population interactions, and populations in communities and biomes follow. The book concludes with chapters on the evolution and ecological roles of man.

The authors have used special inputs of supplementary ideas in most chapters through the use of spotlight pages and many interesting illustrations. Each chapter has a selected readings list that includes both paperback editions and *Scientific American* offprints.

Possible shortcomings include the lack of chapter reviews and thought questions about the chapters. Some of the chapters tend to be somewhat longer than many students will be used to. Hopefully, the authors will also design a laboratory manual to accom-

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Edited by
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