and interrelated work is necessary to bring the data up to professional standards; however, the information provided should suffice for use by a high-school student.

The authors have described a true ecosystem by considering each habitat independently over at least a year's time; but the coverage seems too sketchy and lacks the necessary interrelationships between habitats. The epilogue exemplifies this point, in that the authors note many areas they would have liked to cover but for one reason or another were forced to omit.

The appendixes will be quite useful to many professional biologists and, more especially, to students who are beginning research in field ecology. Besides a checklist of vascular plants and vertebrates of Bodega Head and a selected bibliography, there are descriptions of the 19 different methods used by the authors in the course of their studies. For the novice ecologist these detailed descriptions of methods would be quite useful. Much of the equipment can be made inexpensively, and plans are included.

The book covers too wide a spectrum and does not completely satisfy either end of it. On the one hand, the listing of each organism by its scientific name might prove burdensome to the novice; on the other, the inclusion of conversion formulas and other familiar information in the body of the text is distracting to the professional biologist. The person who would most benefit from this book is the high-school student who is becoming interested in ecology.

John C. Kay
Iolani School
Honolulu

Education

SECONDARY SCHOOL CURRICULUM IMPROVEMENT: CHALLENGES, HUMANISM, ACCOUNTABILITY, by J. Lloyd Trump and Delmas F. Miller. 2nd ed., 1973. Allyn & Bacon, Inc., Boston. 463 p. $11.95.

This book can be characterized as a resource for persons who are concerned about curriculum content, organization, management, and evaluation in overall perspective. It summarizes in some detail the major issues and challenges currently facing curriculum workers, either as teachers or as administrators. Its content is that of most education textbooks; but, at least in part, it should be considered as representing strong positions with respect to questions prominent in contemporary curriculum decision-making. These include the title topics and their subordinate issues, such as individualization, grading, alternative learning environments, and technology.

A large segment of the book—11 chapters, accounting for about 200 pages—is devoted to issues and action in the subject areas. I found the discussion of the science curriculum especially weak and outdated. Specifically, the authors' description of the programs of the Biological Sciences Curriculum Study indicates that they recognize no BSCS achievements other than the three so-called versions of 10th-grade biology. This I consider irresponsible and inexcusable in view of the wealth of other materials that BSCS has produced and published. One could be led to assume that chapters dealing with other subject fields are equally weak.

However, with the possible exception of those 200 pages, I found the book challenging and rewarding reading. Although the authors are closely tied to administrative points of view, they are reputable and experienced leaders in curriculum innovation and experimentation. Their arguments are concise and to the point and are not extensively defended, except on the basis of judgments derived from experience and, one presumes, a substantial knowledge of the field. The questionable pages mentioned above might have been better used in scholarly defense of those judgments.

Thomas J. Cleaver
University of Texas
San Antonio

ELEMENTARY SCHOOL SCIENCE: WHY AND HOW, by Kenneth D. George, Maureen A. Dietz, Eugene C. Abraham, and Miles A. Nelson. 1974. D. C. Heath & Co., Lexington, Mass. 233 p. $4.95 (softback).

The authors have done an excellent job in organizing this textbook for prescience or inservice teachers. It is divided into three main sections, corresponding to decisions a teacher must make in teaching a science lesson: (i) the objectives to be attained; (ii) the methods of attaining those objectives; and (iii) the methods of evaluating what is attained. Subdivision of those three main ideas constitute sections of the book. There is a sufficient amount of illustrative material to enable the reader to grasp the concepts presented. The text is straightforward and readable, and an ample bibliography for each chapter allows the reader to pursue favored topics in depth. Missing are detailed descriptions of "new" elementary science programs. This book and its companion, *Science Investigations for Elementary School Teachers,* make an interesting attempt at guiding the novice through the labyrinth of elementary science instruction.

Glenn McGlathery
University of Colorado
Denver

Evolution

EVOLUTION, by Charlotte J. Avers. 1974. Harper & Row, New York. 324 p. $5.95 (softback).

This textbook could easily be comprehended by any intelligent adult willing to make the special effort of looking up a number of details. For the college student—the intended reader—the book provides an exceptionally well-balanced and well-written approach to the understanding of this exciting field of study. This would be an excellent textbook for an 8–10-week course in evolution, but it would need to be supplemented for use in a 16-week (semester) course. However, it could be adapted to a 4–5-week segment of a basic course, by wise selection of chapters.

The greatest attribute of the book is the author's treatment of the content in terms of intellectual inquiry and problem-solving. Avers presents ideas as hypotheses supported by hard evidence; hers is a model of scientific thinking and scientific explanation. Furthermore, she has a fundamental insight into the problematic aspects of evolution, and this has led her to the selection of relevant and linearly logical content. Ideas and data flesh out the fundamental concept that molecules (simple or complex) and organisms (simple or complex) evolve wherever a selective advantage of any type accrues to the molecule or organism over shorter or longer periods of time amid changes of population or of environment.

The section on the origin of the universe, although well researched and well written, is irrelevant to an understanding of organic evolution; the book could have begun on p. 27. It is sufficient to postulate conditions under which "living" matter originates, is organized, and develops. The chapter on the origin of life is particularly well done, but the suggested readings could have included the work of Fox, of Miller and Urey, and of Ponnamperuma.

Chapter 4 has clear sections on the evolution of photosynthetic systems and of aerobic respiration. Although some attention is paid to biochemical evolutionary patterns and relationships, this part of the chapter should have been expanded to include the newest work on evolutionary relationships of many organic molecules other than cytochrome C and the hemoglobins. An excellent chapter follows, on prokaryotes and eukaryotes. Another especially good chapter is the one on the evolution of genetic systems.

In the section on basic principles of selection the author points out the tautology of the phrase "survival of the fittest"—a phrase frequently used without a real look at what it means. The fundamental meaning of "fittest" has to

do with those organisms that leave the largest number of offspring, and "survival" means leaving the most individuals to perpetuate the line; thus, "populations that leave the most offspring are those that leave the most offspring."

In the chapter on human social organization the author discusses the modification of male anatomy, male physiology, and male intelligence in the evolution of man as a hunter; and then she says, "Females would have benefited only indirectly from such a gene pool." But isn't it true that at least half of the female's genes are contributed by the father and that any dominant traits thus transmitted can be manifested in the female in immediate generations following the transmission? Even recessive traits can be brought together in any female from a whole single set of chromosomes contributed by her father and a whole single set of "paternal" chromosomes from her mother.

Again, female chauvinism rears its pretty head when, in the section on the evolution of behavior, the author says, "Perhaps the basis for the frequent choice of the baboon as a model of prehominid or hominid sex role has more to do with the fact that the male baboon shows strict dominance socially and sexually than with its being a savannah resident." This chapter, which leans heavily on similarities and differences of sexual behavior, could have been improved by the addition of a reference to the exciting work at Stanford by Seymour Levine, who is investigating sex differences in the brain.

The book has few factual or typographic errors. It should be on the shelf of every high-school or college biology teacher.

Alfred Novak
Stephens College
Columbia, Mo.

Genetics

HEREDITY AND HUMAN AFFAIRS, by James J. Nagle. 1974. C. V. Mosby Co., St. Louis. 346 p. $10.00 (hardback).

Intended as a college textbook for nonbiology majors without previous college biology courses, this book covers much up-to-date material on human heredity, reproduction, and evolution.

Much of the material in the first three chapters dealing with evolution is basic. However, Nagle includes a good deal of historical material that is difficult to find in a single reference source. His rationale for covering evolution at the beginning of the book instead of the end is that this provides a background for relating principles of reproduction and heredity as students progress through the course of study. However, I found the constant references to explanations offered in later chapters most frustrating.

The basic material on reproduction is made more valuable by inclusion of discussions of various methods of birth control. This material is reinforced with statistics concerning the effectiveness of each method.

The nine chapters on genetics cover gene structure and function, various patterns of genetic transmission, and population genetics; and the final chapter deals with the future prospects for treating hereditary diseases and for genetic engineering. Throughout this portion of the book the moral and ethical problems that will have to be faced are pointed out.

No end-of-chapter problems are given but many are offered in the text. Unfortunately, the arrangement of the many figures and tables used in the explanation of these problems seems unnecessarily complicated.

The material in this textbook is excellent, but I feel that most nonbiology majors, without previous college biology courses, would find it most difficult to use. The instructor would have to be an exceptionally fine teacher.

Jean E. Cooper
East High School
Cheyenne, Wyo.

GENETICAL STRUCTURE OF POPULATIONS, by Kenneth Mather. 1973. Halsted Press, New York. 183 p. $12.95 (hardback).

The author's thesis is that the genetic structure of populations strikes a dynamic balance that reflects the many opposing forces acting upon the genes. The basis of selection is variation, which may be environmentally mediated or heritable. If heritable, variation may be chromosomal or genic. If genic, it may be either free (that is, expressed) or potential due to heterozygosis or to the interacting effects of genes at different loci.

Selection, acting upon the phenotype, may be stabilizing, directional, or disruptive. Environmental changes may be fluctuating, cyclical, trending, or abrupt. In order to be effective in selection, environmental changes must be long-term with respect to the life cycle of the organism selected. A trend is more important than a fluctuating or cyclical change.

Other factors that affect the structure of populations are types of reproduction, extent of inbreeding or outbreeding, and inadvertent selection of a character while selection is proceeding for a different one.

Mather feels that new mutations are relatively insignificant in affecting gene frequencies; and, contrary to Sewell Wright, he feels that genetic drift is of little importance, because most populations are larger than Mather's calculated critical size of 100.

Mather begins this interesting and readable book with a minimal mathematical analysis of population equilibria, and he concludes with a discussion of human populations. He draws heavily on his own research on the selection of sternopleural and abdominal chaetae of *Drosophila melanogaster*. He includes an excellent bibliography of both early and recent papers.

The book should be useful to a student contemplating research in population genetics, evolution, or the ecology of natural populations, or to one who just wishes to know more about the effects of selection. It would be understandable to a person who has completed an introductory course in genetics. I feel that it should be in every college library.

Margaret L. Watson
Simpson College
Indianola, Iowa

GENETICS, by Ursula Goodenough and Robert P. Levine. 1974. Holt, Rinehart & Winston, Inc., New York. 896 p. Price not given.

Although the authors state in the preface that "this book is intended to accompany a one-semester course in genetics for college or medical students who have a knowledge of introductory biology and chemistry," it should provide an excellent background for teachers in the biological sciences or other professional and practicing biologists. The chief criticism of the book is the title, which might convey the impression of a conventional, and rather standard, genetics text. Such is not the case and the book might better be entitled Advanced Genetics, for it is certainly for the more advanced student of biology. Moreover, the up-to-date material requires careful study, and it would be difficult to cover the over 800 pages of text material in one semester. The coverage of material in the field of genetics is excellent and comprehensive, and the style of presentation is interesting.

A great deal of information has been brought together here in one volume and examples from the great geneticists, and other biologists, of our times are used in the many photos and fine diagrams. The order of presentation of material is interesting: the book begins with modern or molecular genetics and proceeds to what we often call classical genetics. However, the authors never leave the modern genetics arena as they continuously seek explanations from the field of molecular genetics. Actually, the book contains a large amount of up-to-date information from areas of modern biology such as cellular and molecular biology, hormonal