the project and its relation to the field of investigation is carefully pointed out. This is followed by a discussion of suggested problems that emphasize the nature of the questions which the scientist poses. This is the very heart of the project, and it is here that these volumes demonstrate their excellence and provide a sharp contrast with the typical Science Fair project, which will, I hope, profit by the example. Procedures for carrying out the investigation are suggested and possible pitfalls discussed. Each project is concluded with a list of references, both general and specific.

The projects are not too difficult technically for gifted high school students, nor do they require expensive and complicated apparatus. Commendably, a challenging feature of many of the projects is the emphasis placed on the student's ingenuity in constructing equipment for use in the investigation. But perhaps the most stimulating feature of all is that the great majority of the projects are concerned with questions still largely unanswered. Indeed, "all the projects are in fact invitations to discovery. They emphasize inquiry and encourage independent work; they are presented as a means of developing the artistry of investigation." I know of no more effective way to acquire understanding of science.

CHARLES S. THORNTON
Department of Zoology,
Michigan State University, East Lansing

Career Guidance

Careers in the Biological Sciences. William W. Fox, Walck, New York, 1963. 114 pp. Illus. $3.50.

To one who must answer inquiries from secondary school students about careers in the biological sciences, the appearance of a new book on the subject is welcome, because no book written by a single individual is sufficient. The present little book may be recommended to those who are attracted by out-of-doors biology, for the author himself is experienced in and understands the characteristics of applied nonmedical biology, or agricultural science.

Seven of the nine chapters are intended to excite interest in different biological occupations through specific examples of accomplishments toward human welfare in each. The weakest of those chapters is the one entitled "Thoughtful sciences." It fails to illuminate the attraction that fundamental biological research has for many young people. To be sure, the author realizes that "most people who work and study in these sciences do so because they want to know . . .," but he does not depict the broad scope of fundamental biology, its connections with and dependence upon chemistry, physics, and mathematics, the intellectual challenge and excitement of its pursuit, and its contributions to human welfare in the hands of its scholars and others.

Of the next six chapters, only one deals with biology underlying medicine; the other five give some interesting examples of practical agricultural and wildlife biology, quite worthwhile for a young person who wants to know what goes on in certain scientific services of the departments of Agriculture and Interior.

The first chapter of this book, "The science of life," is pathetically inadequate and might be misleading; it should be skipped. However, the last chapter, "About the job," has some sound information. The 29 photographs in the book give the reader impressions of laboratory and field environments in which biologists work.

Summing up, I find that this book is a light-weight production; it will have little influence on the advance of the biological sciences.

FRANK L. CAMPBELL
Division of Biology and Agriculture,
National Academy of Sciences–
National Research Council

Notes

Paleoecology

Principles of Paleoecology (McGraw-Hill, New York, 1963. 383 pp. Illus. $10.75), by Derek V. Ager, meets the long-felt need for an English language textbook in this field, probably as well as possible in a reasonable amount of space and considering the present state of knowledge with respect to the subject. Although the concepts and practices set forth here are documented in a scholarly manner, the author wisely and explicitly does not attempt to be exhaustive but stays close to the baseline of his own experience and interest. He manages, nevertheless, to cover much of the important ground, the material is well illustrated, and his bibliography of more than 500 references provides an ample list for supplementary reading. Like any first textbook in a rapidly developing field, this one will probably be improved upon. But it moves a long way in the right direction, and it attains, with clarity and directness, its modest stated aim "to introduce . . . a field of study."

PRESTON E. CLOUD, JR.
School of Earth Sciences,
University of Minnesota, Minneapolis

Crystallography

Crystal Orientation Manual (Columbia University Press, New York, 1963. 85 pp. Illus. $4), by Elizabeth A. Wood, is a collection of basic information needed for orientation of crystals for physical measurement or experimentation. By *orient* is meant the process of adjusting a crystal until its orientation relative to a fixed holder is that required for some particular operation or measurement. The determination of the orientation of crystalline grains in a specimen, as in petrofabric study, is not included. The text is divided into 25 short sections and 3 appendixes. The first section (1 page) outlines the procedure for orienting a crystal with references to other sections. The next 12 sections, which deal with basic crystallographic concepts, are followed by two sections on the mechanics of handling a crystal. The remaining sections are devoted to x-ray diffraction methods of determining orientation and include several useful tables and collections of formulae. The appendixes are concerned with the use of polarized light in orienting transparent crystals, examples of Laue photographs, and a brief summary of hexagonal-rhombohedral relationships. The many figures are very well drawn and reproduced.

This manual should be of great value to the numerous chemists, physicists, engineers, and technicians who are faced with the problem of obtaining a suitably oriented rod or section of crystal for their experiments but who lack training in crystallography.

A. PABST
Department of Geology and Geophysics, University of California, Berkeley