tems; they contain a short narrative of paleontology from the ancient world to the present, and offer a résumé of organic evolution, including evidence of such, and its theories and mechanics as well; they describe the earliest primates, manlike apes, fossil men, and *Homo sapiens* himself. Even the story of the Piltdown hoax is retold with interest.

The appendices (A to F), comprising 40 percent of the book, provide a source of material useful to the more mature student. Here are included a synopsis of the divisions of the organic world and their distinguishing characteristics, geologic ranges, and relative importance or unimportance as guide, or index, fossils; a glossary, a list of readings and references on historical geology and paleontology, a register of agencies and dealers supplying maps, publications, fossils, and collecting equipment; and a partial listing of the larger museums where fossils are on display.

We have in *Fossils* a book that should become a welcome addition to the library of anyone interested in knowing more about prehistoric life.

JOSEPH J. GRAHAM
Department of Geology,
Stanford University

Science Today Series

Radio Astronomy. J. H. Piddington. Harper, New York, 1961. 128 pp. Illus. $2.50.

Although radio astronomy began in the United States with the discoveries of Jansky and the solitary work of Reber in the 1930's and the early 1940's, after the war this country inexplicably passed the ball to England and Australia, and also to Russia in terms of theoretical interpretations. A gradual resurgence over the last decade has seen the United States make up most of the deficiency in instrumental facilities, but the loss of much of a generation in the training of students and in the seasoning of senior personnel has not been easy to recover. The effects of this lag appear strongly in the field of monograph publications, none of which has so far been written by an American. The work under review continues this tradition, the author being a distinguished Australian radio astronomer.

Piddington's *Radio Astronomy* is ninth in the Science Today series, a series in which authors are apparently required both to cover their subjects and to quit after precisely 128 small pages.

Since radio astronomy is already a vast subject, this may have been the principal factor imposing an exceptional terseness of text and a relative sparseness of illustration on *Radio Astronomy*. Further, the book is marred by extreme carelessness of production, featuring frequent misprints, sloppy setting of equations, and even occasional questionable grammar. The type is so closely packed as to encourage the reader to seek a strong light. While reasonably priced as a hard-cover, the book is essentially a paperback in content and might better have appeared as such, at a still lower price and with a more generous and careful format.

Such faults, while real, are peripheral, merely tending to obscure what is, apart from a few inaccuracies, basically a good book. The author has packed a remarkable amount of explanation and factual detail into his treatment of instrumentation and techniques, the background and sources as seen in continuum radiation, hydrogen-lines studies, lunar and planetary emissions, and radar astronomy. Nearly a third of the book, and much the best part, is devoted to two of the author's specialties —the generation of radio waves and radio waves from the sun. In fact, this is the only book in which one can find satisfactory brief discussions of the known major source mechanisms, including the important class of space-charge or growing-electron-cloud effects; likewise its brief summary of the complex variety of solar noise events is uniquely good.

The jacket suggests that this book will be interesting to the reader with little scientific training, a statement I question. (So far the only book on radio astronomy which could really appeal to and be read profitably by both scientists and laymen is the splendid and sprightly recent Penguin paperback by F. G. Smith of the Cavendish group.) The author more modestly and more correctly states in the preface his goal of producing a complete but not detailed account, useful as an introduction for scientists working in other fields. Such relatively sophisticated readers, and graduate students first approaching the field, will indeed profit from a close reading of this deceptively simple appearing book.

HARLAN J. SMITH
Department of Astronomy,
Yale University

Geochronological Sequence

Prehistoric Life on Earth. Kai Petersen. Edited, adapted, and supplemented by George Zappler. Dutton, New York, 1961. 163 pp. Illus. $4.95.

This beautifully illustrated, clearly written, semipopular book presents a geochronological sequence of animals since pre-Cambrian time. It is a refreshing approach to the origin and succession of life on earth. A pictorial geologic time chart is included. The author states that the continents, as we know them today, have always been approximately in the same relative position to each other. Life is said to have originated somewhere far back in pre-Cambrian time when inanimate substances, in some way unknown to us, changed into organic compounds that could reproduce themselves.

Petersen stresses evolution, dispersal, and distribution of the vertebrates. The evolutionary transitions between the major groups that we now recognize in our classification are described and their selective adaptations toward more efficient means of reproduction, the prevention of desiccation, temperature control, better nervous and circulatory systems, and locomotion are elucidated. The earliest vertebrates are thought to have originated in a fresh-water environment.

Most of the discussion and description of invertebrates is centered on the early and middle Paleozoic assemblages. Reference to plants is usually in connection with vertebrate environments and the first land plants are said to have appeared during the Silurian-Devonian transition.

There are chapters that include discussions of the early history of paleontology, of fossils and of how these remains were buried, of heredity and selection, and of classification. Relationships of the different groups are illustrated with numerous phylogenetic figures. There are 44 black-and-white figures and 83 stimulating color illustrations, but there is no bibliography. This book will be useful to both high school and college students.

The following comments about some of the illustrations may be useful to readers: on page 20, the names *Merychippus* and *Miohippus* should be reversed; on page 25, the large extinct mammal is a glyptodont, not an armadillo; on page 121, the cranium of *Andrewsarchus* is elongate and probably as long, or longer, than the entire

length of *Miacis*; on page 123, the upper figure probably represents *Palaeomastodon*; on page 136, there is no evidence of *Diceratherium, Dinohyus,* and *Syndyoceras* being contemporaries of *Merychippus*, mastodonts, *Alticamelus*, and *Cranioceras*; on page 151, a preferable late Pleistocene assemblage would be *Bison antiquus, Camelops hesternus*, and *Cauis dirus*; on page 154, there is no evidence that *Castoroides* cut down trees or had a flat tail.

R. A. STIRTON
Museum of Paleontology,
University of California, Berkeley

Comprehensive Survey

McGraw-Hill Encyclopedia of Russia and the Soviet Union. Michael T. Florinsky, Ed. McGraw-Hill, New York, 1961. xiv + 624 pp. Illus. $23.50.

The primary task of an encyclopedia is not to add to knowledge, but to pull it together, systematize, and make it readily accessible for interested readers. The present volume, a product of the labors of a highly competent staff, offers no new views, facts, or ideas; its main virtue is that it provides the most comprehensive 1-volume English-language survey of the Soviet Union—its natural setting, ethnic composition, historical background, intellectual and literary tradition, and modern institutions. Surveys of Soviet industry, agriculture, economic planning, technology, law, social insurance, and the medical system, as well as of dozens of other topics are necessarily brief, yet they are modern in design and illustration, wide in compass, and rich in significant detail. The suggested readings at the end of each major article are carefully selected, and they are kept to a minimum. The readings will be most useful to persons seeking additional information, and they also provide an impressive index of the comparatively advanced status of Russian and Soviet studies in this country.

The development of scientific thought has been given special emphasis. Three distinct and complementary approaches have been used to ensure a comprehensive survey of science. The *biographical* approach has been employed most extensively and with the greatest consistency. The book contains short sketches of most leading scholars, from Mikhail Lomonosov in the middle of the 18th century to hundreds of present-day Soviet academicians and other members of the scholarly elite. Some sketches are too brief to be meaningful, and some suffer from misplaced emphasis: they put more stress on published works than on scientific ideas. It is a pleasure to see the names of Soviet scientists, such as A. A. Balandin, an eminent chemist, who for ideological or other reasons were ignored in the *Great Soviet Encyclopedia.*

The extensive use of the *disciplinary* approach—the coverage of the status and development of individual sciences—has produced satisfactory results. The volume has particularly good articles on physics, chemistry, mathematics, physiology, biology, genetics, and geology. I would have liked to see special articles on anthropology, ethnography, soil science, and geography —the areas in which both Russian and Soviet scholars have made substantial contributions.

The *institutional* approach, the surveying of associations and agencies dedicated to scientific pursuit, has not been employed adequately. The work and the organization of the Soviet Academy of Sciences has received fairly detailed treatment; however, the Academy's many regional branches as well as the analogous institutions operating on the Union-Republic level have been listed but not described. Most learned societies, some with deep historical roots, have been overlooked. A more thorough utilization of the institutional approach would have enabled the editor and the staff to treat such important topics as the organization of research, academic stratification, political control over scientific work, and the relationship of science to ideology. The institutional loci of decision-making relevant to the establishment of research priorities and budgetary allocations are discussed in Leon Trilling's excellent article, "Technology."

In keeping with the spirit of our scientific age, ample space has been given to special articles covering "atomic energy," "space science," "automation," and "electronics."

A monumental source of pertinent, reliable, and systematic information, this volume adds significantly to our understanding of the Soviet Union and its Russian cultural heritage.

ALEXANDER VUCINICH
Department of Sociology
and Anthropology,
San Jose State College

Pacific Exploration

The Journals of Captain James Cook on His Voyages of Discovery. vol 2, *The Voyage of the Resolution and Adventure, 1772–1775.* J. C. Beaglehole, Ed. Published for the Hakluyt Society. Cambridge University Press, New York, 1961. clxx + 1021 pp. Illus. Maps. $19.50.

"Like his greatest contemporary, George Washington, who won a great war without winning a battle," James Cook was great, not for a moment "but of the whole life," wrote Arnold Wood. Cook, the son of a farm laborer, first shipped with the coastwise collier *Freelove*, and he took his first command at 27. Eight years later he observed the sun's eclipse for the Royal Society. On 13 July 1772, he sailed in H.B.M.S. *Resolution* on his second voyage to probe again Terra Australis, a mirage that rose like mermaids to deceive mariners. This second voyage brought more *re*discoveries (Mendaña's Marquesas, Quiro's New Hebrides, and Captain Roggeveen's Easter Island) than discoveries (New Caledonia, South Georgia, and Norfolk Island). "If I have failed in discovering a continent, it is because it does not exist in a navigable sea, and not for want of looking after."

Beaglehole will stand to Captain Cook as editor-scholar Julian Boyd stands to Jefferson. For the hurried reader, there is the Everyman edition and Grenfell Price's recent sampler (Heritage Press). For the "curious" reader, Beaglehole has charted the research deeps and found details unsounded in the history of Pacific exploration. The anthropologist, systematic botanist, ornithologist, marine biologist, and others will return to pick up facts serried in stratified footnotes. Cook's men witnessed cannibalism on the quarter deck, named islands, described penguins, penis sheaths, and the first Old World passion flower, encountered yaws, and gave away goats, sheep, cats, seeds for planting, nails, nails, and more nails, beads, knives, looking glasses, and, reluctantly, shirts off their backs! They kept their health, far beyond the fortunes of their contemporary seamen, with sauerkraut, carrot marmalade, and fresh greens. "I cannot say," wrote Cook on a particularly sprightly page, "that the women [of Tana] are beauties but I think them handsome enough for the men and too handsome for the use that is made of them."