run, including the tasks to be accomplished before, during, and after the run.

Although most of the information presented is available elsewhere in the literature, the author has done an outstanding job of compiling and organizing the knowledge available into a single volume.

J. E. LINDSAY

Standard Oil Company of California,

Introductory Textbook

Principles of Physics. Earnest S. Greene. Prentice-Hall, Englewood Cliffs, N.J., 1962. xxiv + 608 pp. Illus. $9.75.

This book successfully achieves its goal—that of being a text for an introductory liberal arts physics course—by combining modern physics with what has been conventionally taught of classical physics in an introductory course. The first few chapters also show that Greene has a sympathetic understanding of the average student's problems in learning physics, for these chapters constitute his advice and instructions to the student on study habits and, in particular, on how to study physics. It is debatable whether this advisory material should be a part of the text. The student should have such advice, but I am inclined to think verbal advice is more effective.

Most of the paragraphs and topics are very well handled, but there are a few rather standard poorly-done sections. By standard I mean that in most other textbooks they are also inadequately treated. Two sections which could be improved are those that treat electric potential and relativistic motion. In the case of the electric potential, too much is said about the analogy with water pressure and too little about the different character of energy associated with electron flow.

I wish that, along with his excellent psychological advice about study, the author had gradually increased the mathematical level of his approach to physics. An approach to physics, or to any science, in which a minimal amount of mathematics is used is comparable to a study of Germanic literature by a student who cannot read the German language.

R. N. LITTLE

Department of Physics,
University of Texas

Nuclear Industry

Advances in Nuclear Science and Technology. vol. 1. Ernest J. Henley and Herbert Kouts, Eds. Academic Press, New York, 1962. 366 pp. Illus. $12.

This is the first volume of a new annual series that promises to cover every aspect of the nuclear industry except pure mathematics, theoretical physics, and radiation biology and medicine. The articles are reviews of rather specific engineering systems (proposed and actual) or of broader fields of technology. In all cases the authors treat their subjects by invoking both specific and general principles, as the case permits, in order to achieve maximum usefulness and clarity for the reader. Volume 1 contains seven comprehensive articles that average 50 pages each.

In the first article, "Thermodynamic analysis of nuclear power stations," S. Baron reviews the thermodynamics of various steam cycles and the overall plant factors that govern the efficiency and economics of operation. Particular emphasis is given to the importance of steam separators and the efficiency of the high pressure saturated steam cycle relative to the superheated steam cycle.

The GBSR concept is discussed in considerable detail in the second article, "The GBSR, a graphite moderated boiling water steam superheat reactor," by L. S. Mims and D. J. Stoker, and its competitive position with respect to fossil fuel plants is outlined.

"Radiation-induced graft polymerization," by G. Odian and H. W. Chandler, provides a comprehensive account of both the basic kinetics and the copolymer properties that result from grafting one polymer onto another by the use of ionizing radiation. Included in the presentation is a table that displays yields on a wide variety of grafted polymers synthesized by the technique of mutual irradiation.

The fourth article, "Diffusion in uranium, its alloys and compounds," by S. J. Rothman, is a most scholarly presentation, replete with tables, graphs and an extensive bibliography. A considerable portion of the article is devoted to the diffusion of rare gases in both uranium and uranium oxide.

In "Performance characteristics of large boiling water reactors," G. M. Roy and E. S. Beckjord give a very good account of the basic reactor dynamics of such plants, and they specifically illustrate the properties of these systems in terms of the Dresden performance and test.

J. E. Ullmann's paper, "Economics of nuclear power," is qualitative and brief, but clear and to the point. The expectation that a real growth in nuclear power will begin by about 1965 is defended by a broad analysis of all the factors involved.

"Chemonuclear reactors and chemical processing," by M. Steinberg, is the most extensive of the papers. Numerous tables and graphs are given which are basic to the design of such as yet unrealized systems. The properties of specific chemonuclear processes, such as nitrogen fixation, carbondioxide cracking, and the production of ethylene glycol, phenol, and hydrazine are given.

In conclusion, I am happy to agree with the editors that these articles meet the requirements of being authoritative, complete, coherent, and critical, although in principle I am only able to testify to the last two properties (note the introduction to the book).

C. O. MUELHAUSE

Reactor Program,
National Bureau of Standards

Russian Geotectonics

Basic Problems in Geotectonics. V. V. Beloussov. Translated by Paul T. Broneer for the American Geological Institute. John G. Maxwell, Ed. McGraw-Hill, New York, 1962. xvi + 816 pp. Illus. $14.

Something old, something new,
Something borrowed, something Red.

This ambitious volume demands the attention of all geologists interested in the problems of earth structure. Its scope is rather overwhelming—too much for a single volume—and the results are brilliance in some areas, mediocrity in others. Throughout, it is a fascinating insight into the Russian geologic viewpoint and attitude. The author is the dean of Russian structural geologists, and in recent years his name has become familiar among earth scientists throughout the Western world.

This volume, essentially a translation and revision of a Russian edition published in 1954, is divided into eight parts. In the first 50 pages Beloussov deals with the methods and historical development of geotectonics, and he

includes an excellent summary of the history of geology. Part 2 is a rather superficial discussion of the internal structure, composition, and origin of the earth. This is followed by a section devoted to a description of primary structures in sedimentary and igneous rocks and of secondary structures (including folds and faults) in deformed rocks. The treatment is standard, but the examples are largely Russian. In part 4 (200 pages) Beloussov develops the principal theme of the book—that is, the significance of vertical oscillatory movements of the earth's crust and their absolute control of the deposition of sediments. In the following section he discusses tectonic movements that produce folding. He begins with a too brief section on stress and strain; this is followed by a lengthy but rather narrow treatment of discontinuous (supratenuous) folding, and he concludes with a general discussion of the relation of folding to geosynclinal theory. In part 6, which deals with rupture, the author describes some very interesting Russian experimental work. Part 7 is a much too cursory treatment of the relation of igneous activity to geotectogenesis. In the following 70 pages he summarizes geotectonic processes and sketches the present tectonic structure of the earth—a rather stupendous undertaking.

In the final section Beloussov reviews and dismisses all Western theories of geotectogenesis. He has made a serious attempt to digest Western geologic thought and literature (the bibliography has 519 entries), but Western contributions made during the last 20 years are treated rather lightly. Beloussov seems convinced that most geologists outside of Russia are married happily to the contracting earth hypothesis. He criticizes other Western theories for inadequately demonstrating causal mechanics, but he admits his own oscillation theory is based upon imperfectly understood processes (he favors differentiation resulting from unequal distribution of radioactive heat). Western geologists may be dismayed by Beloussov's somewhat dogmatic approach, but his underestimation (we hope) of us is not very different from our tendency to underestimate Russian progress.

Excellent volumes like this one will stimulate geologic thought throughout the world.

BATES MCKEE
Department of Geology,
University of Washington

Astronomy

The Distribution and Motion of Interstellar Matter in Galaxies. Proceedings of a conference held at Princeton, N.J., April 1961. L. Woltjer, Ed. Benjamin, New York, 1962. xiv + 330 pp. Illus. $11.75.

Within the past 15 years interstellar polarization and the 21 cm radiation from interstellar hydrogen have been discovered, the Palomar Sky Survey has been completed, the 200-inch Hale and the 120-inch Lick reflectors have swung into action, colliding galaxies have been discovered and studied (by radio and by optical techniques) out to distances of more than a billion light years, and use of the synchrotron mechanism has shown that radiation from the Crab Nebula is heavily polarized. It has also become increasingly evident that stars not only condense out of the interstellar medium but that they also contribute to it; thus, the great questions of the evolution of the stars and galaxies are directly related to the subject matter of the book. In consequence, studies of interstellar matter have assumed a new importance and are increasingly engaging the attention of astronomers and astrophysicists.

There were 27 participants at this conference which was held at the suggestion of Bengt Strömgren. The papers, with essential parts of their discussions, have been published in this book about as they were presented at the conference. There are twelve papers on the characteristics of interstellar matter in our galaxy, three on the characteristics of interstellar matter in other galaxies, five on small-scale dynamics of interstellar matter, and ten on large-scale dynamics of interstellar matter. Following these 30 papers is a report of the concluding session, with summaries by Strömgren and Woltjer, and 11 pages that report the general discussion, with J. H. Oort presiding. Although some fundamental considerations concerned with the physics, and especially with the chemistry, of interstellar matter are not covered, the discussions are nevertheless extraordinarily wide ranging and at an advanced level.

This book is for the serious astronomer, not the casual reader. It gives a useful, authoritative summary from many points of view of our present knowledge and speculations, of observational programs recently finished or still to be completed, and of many still unanswered questions related to the four components of the interstellar medium: the gas, the dust, the cosmic rays, and the magnetic fields. Dust, one of the four components of interstellar matter, is almost always found in connection with the spiral arms that are characteristic of multiple-arm galaxies, such as the one shown on the cover of this issue.

JOHN B. IRWIN
Astronomy Department,
Indiana University

Nuclear Radiation

Radiation Effects on Organic Materials. Robert O. Bolt and James G. Carroll, Eds. Academic Press, New York, 1963. xvi + 576 pp. Illus. $13.50.

Radiation Effects on Organic Materials contains essays written by scientists from industrial and government laboratories and is concerned with the effects of nuclear radiation on the properties of organic liquids, gases, and solids. The editors state in their preface that the book is intended for those in research and development who are conversant with the fundamentals of physics, chemistry, and engineering. Consequently, very little effort is made to cover the basic underlying principles, although the first four chapters—an introduction and a treatment of the interaction of radiation with matter, the chemical effects of ionizing radiation, and the radiation chemistry of pure compounds—summarize the fundamental principles. No derivations of equations are given, but principles and the results are stated as a matter of course. In general, the book is well referenced, so the reader can easily expand his background on any particular subject.

The remaining chapters treat radiation effects on polymers, plastics, elastomeric materials, nuclear reactor coolants, lubricants, adhesives, textiles, coatings, films, dielectric fluids, fuels, fluid shielding materials, coal, wood, and explosives.

In my opinion, one of the book's most valuable characteristics is its broad coverage of the literature, much of which is often not conveniently available. There are frequent references to reports published by the Atomic Energy Commission and the Air Force, to journals that cover a large number of disciplines, and to other similar sources. Certainly the objective of summarizing the literature and its background ap-