works are not even included at the end of this chapter. In general, in this area, too few references are given to other works on the various subjects in most of the chapters, and yet, in many ways, the volume is not self-sufficient.

The book, however, contains many very practical hints and suggestions that were obviously born out of the experiences of the author and his collaborators. The chapters on "Target considerations" and "Prelaunching and launching" are particularly significant in this regard. The book also gives many examples of economic considerations, such as Chapters 15, 19, and 20, all of which are so necessary to guide our young and brilliant engineers in this highly important field.

In general, the book provides a valuable aid for advanced courses in universities, either as source material or as an advanced part-time text in specialized courses. Its primary value, however, is that it provides source material and refresher material to engineers who must perform daily tasks as advanced systems designers in both civilian and military establishments in this highly complicated field.

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Astrophysical Quantities. C. W. Allen. Athlone Press, London, 1955 (distributed in the United States by John de Graff, Inc., New York 10). xi + 263 pp. $10.

Here is a volume that every teacher and research worker in astronomy and its allied sciences will want handy for quick reference. A large number of physical constants and quantities are tabulated, in addition to what the author considers to be the best available data on the earth's atmosphere and interior, the sun, stars, planets, nebulae, and galaxies. Great care has been taken to give clearly the units of every quantity that is tabulated, and numerous conversion formulas are included. Copious references provide the reader with the sources from which much of the information is drawn. The judgments by which the author derived the tabulated values are not given.

The material embraced in this compilation runs over such a wide range of subject matter that it is scarcely to be expected that all topics would be covered to the same degree of thoroughness and reliability. More data pertaining to radio astronomy might have been included advantageously. In a number of instances, better data than those quoted exist in the literature. The temperatures quoted for the interior of the earth seem improbable. The failure to distinguish between the Rosseland and Chandrasekhar mean absorption coefficients in section 65 is unfortunate. Section 95 does not do justice to the various three-color systems such as those of Becker, Johnson, and Morgan, which appear to be of increasing importance in photometric work. The table of line emissions in planetary nebulae would have been much better if it had contained the actual data for some particular nebulae. The table of partition functions is somewhat inadequate.

Various minor shortcomings are manyfold offset by the great service that has been rendered in putting together in a concise fashion so much of the basic useful quantitative data in astrophysics.

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Principles of Physical Metallurgy. Morton C. Smith. Harper, New York, 1956. 417 pp. Illus. $6.

This book is the first of a two-volume series. The second book, *Alloy Series in Physical Metallurgy* was not available for this review. The author's expressed purpose is to ". . . assist the thoughtful metallurgist . . . in achieving a fundamental understanding of metal behavior." Smith recognizes the difficulty in pleasing both the scientist and the engineer in one book, but, unfortunately, it appears that his efforts please neither one.

A little less than the first half of the book is devoted to elementary atomic physics, crystallography, crystal types, polymorphism, and crystal imperfections. This last subject includes such diverse topics as freezing of metals, dislocations, Hume-Rothery rules, and ordering. A brief chapter on magnetic and electrical properties completes the first section. The organization and method of presentation are neither bad nor distinguished; in essence, the author has boiled down the well-known books of Seitz, Cottrell, and Barrett. The coverage of topics is broad rather than deep, and tends to vary in emphasis. Four pages are devoted to the amorphous "Beilby layer," and somewhat less space is given to dislocations, although the latter are subsequently reintroduced. Dislocations, lineage, and mosaic structure are treated successively with no attempt at interrelation.

The greater part of the book concerns deformation of metals, effects of deformation and temperature, and fracture. The subjects are treated in a rather loosely knit fashion. Descriptions of the various properties are usually general with occasional references to specific alloy systems. Little use is made of the theories developed in the first half of the book. Although about 20 pages are devoted to creep, experimental work and theory of the last 10 years are largely ignored.

A great many (apparent) statements of fact are open to question; for instance, Smith states that second-stage and third-stage creep do not occur in compression, although it is well known that they do. In another example, he states that mechanical polishing of copper results in mechanical twinning. Unfortunately, there are very few references, so that one cannot trace some of the author's unusual conclusions to their sources.

Attempting to educate the engineering metallurgist, as the author intends, is a worthy and much-needed endeavor, but in a book of this size it is difficult to give more than superficial coverage of many important topics; the author has done no more. Furthermore, the lack of references and the use of books for most references (thereby causing much material to be out of date) decrease the usefulness of the book if it should whet the interest of the reader.

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Structural Geology for Petroleum Geologists. William L. Russell. McGraw-Hill, New York, 1955. x + 427 pp. Illus. $7.50.

Russell's new textbook on *Structural Geology for Petroleum Geologists* has been prepared with an objective that, to my knowledge, is new, original, and so worthy that I wonder why it had not been thought of before. As the title indicates, it is neither a textbook on petroleum geology nor a textbook on structural geology, although it includes and combines subject matter ordinarily treated in each of these, omitting parts of the other subjects that do not bear on the new objective.

In the subject of petroleum geology, it thus omits such matters as chemistry of hydrocarbons, the hydrology of petroleum deposits, and the origin, migration, and accumulation of petroleum; in the subject of structural geology, it omits structural features of metamorphic and igneous rocks, neither of which ordinarily contains petroleum deposits. The text is, however, not merely a treatment of the structure of known oil and gas reservoirs, for the petroleum geologist is less a developer of proved deposits than he is an explorer for deposits yet un-