ton's laws. There are several good chapters on oscillatory motion, and Lagrange's equations receive an adequate treatment. The motion of a particle in a central force field is examined in considerable and interesting detail, and this is followed by a treatment of two-particle collisions. The dynamics of rigid bodies is also given an extensive discussion, as are the subjects of small oscillations and waves in one-dimensional systems. There is no treatment of elasticity or hydrodynamics.

The level of difficulty is intermediate between that of the standard elementary texts, and that of Goldstein's *Classical Mechanics*. Somewhat to my surprise, examination of the library at the Bell Telephone Laboratory showed that there are not many texts on mechanics at this level and oriented toward the needs of students of modern physics. Therefore, the publication of this book seems well justified.

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Ecology

Grundriss der Ökologie. Wilhelm Kühnelt. Fischer, Jena, Germany, 1965. 402 pp. Illus.

A modern textbook of ecology, in the German language, was badly needed, and this one is meritorious. Wilhelm Kühnelt, an Austrian ecologist, has selected from the world literature a vast array of references, illustrations (141), tables, and graphs. Although the facts and theoretical background presented are applicable to North American problems, many of them are not included in English-language textbooks. Kühnelt's book is therefore recommended as supplementary reading for environmental scientists, engineers, and landscape planners.

In this era of concern over the rapid and unchecked deterioration of the human environment, a section of this book is appropriately devoted to man-induced changes in the environment. The section is especially valuable because the measurements presented were made in old Europe where changes have been recorded over long periods of time.

The author examines records of the physical and chemical features of urban communities which show, among other differences, higher temperatures, lower light values (in winter), increased amounts of silicon dioxide and carbon dioxide in the air, and increased noise levels. Their effect on the vegetation and the animal life is projected and evaluated in part. In addition, examples are given of animal communities which now occupy micro-habitats that are peculiar to cities—for example, sewer canals and pipes, rain gutters, industrial yards, wine cellars, markets, and attics.

The impact of radioactive fallout, insecticides, and other man-made products on the environment is constructively analyzed. Historical events—climatic changes and vegetational shifts that have taken place and are reflected in pollen and animal fossils from the sediments of lakes—are interpreted in an ever-changing ecosystem.

Kühnelt suggests replacing the commonly used designation, terrestrial or landscape ecology, with the term *Epeirology*. This term would serve with limnology and oceanography as a companion subdivision of ecology.

More than 1200 references are cited, and many of them are reviewed critically. English-language sources are not neglected, but of great value are important references to work published in eastern and western Europe and not available here except in our largest libraries. Unfortunately, the reference to the American "Bible" of ecology written by Chicago's great "APPES" (Allee, Park, Park, Emerson, and Schmidt) fails to list Schmidt among the authors. Otherwise I noted relatively few errors.

Despite the emphasis placed on animal ecology, the role of plant associations is not ignored, especially in the chapter on communities. Here the animals' habitats (marine, freshwater, and soil), as well as the terrestrial vegetation, receive thoughtful treatment.

The principle of Liebig's law of the limiting factor comes in for well-justified criticism, and it is replaced by the more modern one, that cause and effect in ecological change are the result of simultaneous action of multiple factors, the evaluation of which requires more sophisticatedly designed experiments, with refined statistical procedures and using new computer programs in many cases. Kühnelt's book is nonmathematical, but he acknowledges the modern trend in ecology and discusses the newer concepts of energy flow in ecosystems. Much of the jargon commonly encountered in ecological literature is avoided.

In a handsomely illustrated chapter, the adaptational structures of animals as well as their ability to construct life sustaining features receive more emphasis than is provided in comparable English-language volumes. This "natural history" approach to ecology, in an age of molecular biology, is indeed refreshing.

Kühnelt's extensive treatment of social animals, mutualism, and parasitism reflects a traditional European bias in animal ecology.

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Aerospace Science

Atomic and Space Physics. Alex E. S. Green and Philip J. Wyatt. Addison-Wesley, Reading, Mass., 1965. xvi + 619 pp. Illus. $18.75.

Atomic and Space Physics is an interesting but rather unconventional text, as one may guess from its title. Assuming as background only elementary courses in physics and calculus, the authors have covered an amazingly wide array of topics with admirable versatility.

About half the book deals with basic physics. Newtonian dynamics, with emphasis on planetary motion and rocket flight, is developed in the first chapter. Four chapters treat theoretical spectroscopy: Chapter 2 gives an introductory review of basic concepts, including the Bohr-Sommerfeld atom; chapter 5 treats a few of the basic problems with the Schrödinger equation and presents a detailed discussion of elastic scattering; chapter 6 covers the vector model of the atom and discusses atomic radiation with the classical (oscillating-dipole) picture; and chapter 7 gives the elements of molecular structure.

The first portion of chapter 4 outlines some basic concepts in plasma physics, such as plasma oscillations, Debye shielding, and motions of a charged particle in a magnetic field. The remainder is concerned with space physics: the geomagnetic field, the solar corona and solar wind, solar activity and cosmic rays, and the radiation belts (natural and artificial). Chapter 8, on radiative transfer, is also a mixture of the basic subject and

the applied problems (models of molecular band absorption and continuum radiation in stellar atmospheres).

The other five chapters deal mainly with the upper atmosphere; infrared, ultraviolet, and x-ray spectroscopy of planetary atmospheres; the sun and stars; radio astronomy; and some miscellaneous applications of atomic physics, including the laser, ionization equilibria of gases, and the reentry problem.

On the premise that the educational philosophy behind this text is a desirable one, I think the authors have turned out quite a respectable work. But the philosophy is the debatable issue. There is no doubt some advantage to integrating the study of fundamental physics with the more applied subjects of geophysics, astrophysics, or space physics, even at the elementary and intermediate levels. Astronomy departments, for example, have long lived with the problem and have handled it in various ways. Some feel that if an astronomy student can acquire his advanced physics in astronomy courses, rather than in the curriculum of the physics department, some needless duplication is avoided and the student saves a great deal of time. And since the physics is always illustrated with practical problems anyway, why should not the problems in plasma physics involve the solar corona, say, instead of controlled nuclear fusion?

One obvious disadvantge in covering too wide a spectrum in a course or book is that it cannot be covered very thoroughly. In this book, space limitations often require the use of such statements as "it can be shown," and one wonders how much genuine understanding a student can gain when much of the physics is developed sketchily or is merely stated. Thus, there is a trade off between enticing the interested student into space physics early and providing him with more thorough instruction in fundamentals.

If you adopt the former view, this book should serve your purposes rather well, although some of the sections on space physics give the impression of having been put together hastily. But I suppose one's main reaction will be a matter of individual preference. As Bernard Shaw's Devil would say, "It takes all sorts to make a universe. There is no accounting for tastes."

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Physical Inorganic Chemistry Series

Elements of Inorganic Chemistry. Robert A. Plane and Ronald E. Hester. Benjamin, New York, 1965. xvi + 188 pp. Illus. Paper, $3.95; cloth, $8.

The avowed purpose of this book is to serve in conjunction with *Physical Inorganic Chemistry* by Sienko and Plane (Benjamin, New York, 1963) as "a text for a one-term advanced inorganic chemistry course." If such a course is at the upper-division undergraduate level, this book will be adequate and useful; however, it is difficult to envision it as the text for an inorganic chemistry course at the graduate level. Basically, the content is descriptive chemistry, with all of the chemical families receiving coverage that ranges from scant, in the case of the lanthanides and actinides, to moderately comprehensive in the case of the halogens. This great variation in emphasis stems from the impossible task that the authors have undertaken —that of adequately describing the chemistry of the elements in 188 pages. To achieve the necessary condensation, Plane and Hester have made numerous omissions that seem arbitrary, but such criticism probably could be leveled at any inorganic chemistry text of less than several thousand pages in length.

A more serious criticism concerns the cursory treatment of certain topics that has crept into the book along with the condensation. It would have been better to omit some sections than to present them in their present form. The first paragraph in section 4-5, on complexes, and the discussion of nuclear magnetic resonance in section 1-1 may be cited as examples. The latter topic would seem more suited to extensive treatment in the text by Sienko and Plane.

On the positive side, the descriptive chemistry is well fortified with clearly presented experimental data, and heavy reliance on these data is made to establish a basis for descriptive concepts. Furthermore, the book is up to date, and an obvious effort has been made to present inorganic chemistry as a fascinating and active area of endeavor.

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Techniques and Instrumentation

Telemetry Systems. LeRoy E. Foster. Wiley, New York, 1965. x + 308 pp. Illus. $12.75.

This book fills much of the long existing need for a primer on telemetry and instrumentation systems. The well-written chapters on practical fundamentals will be useful to engineers and technicians in their first work with telemetry and instrumentation. A valuable set of "ground rules" for the instrumentation engineer and test sponsor is included. These rules clearly show the author's familiarity with practical telemetry and instrumentation problems, and they will give the reader an appreciation of those problems. The discussions of tracking, telemetering, recording, and data-processing systems, including the descriptions of the hardware used, will help make intelligible much of the telemetry jargon in use today.

The preface includes a statement that this is intended to be a comprehensive reference work for the engineer who is experienced in the use telemetry systems as well as an introduction to telemetering systems and techniques. Unfortunately, the lack of rigor in the analyses, the failure to include descriptions or even mention of numerous current telemetry techniques and operating characteristics, and the misleading descriptions of equipment make this book of little value as a comprehensive reference source. Twenty-eight pages are devoted to a comparison of modulation techniques in which two samples per data cycle are used as the basis of comparison for digital techniques. Three pages later, it is noted that at least four or five samples per data cycle are required in practical systems. This is indeed true; thus, the comparison presented can be misleading. There is no discussion of phase lock, frequency modulation with feedback, predetection recording, and many other techniques that have been developed in the past few years and