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