in Table 1.1; the reference to a platform (platinum) indicator electrode (page 133); several errors in the radioactive decay series (pages 293–294). About half of the book is composed of tables and figures, several of the latter being of unnecessary crudity, for example, 1.1, 1.21, which are of primary school level. Although most of the writing is clear and unexceptionable, I found the author's numerous philosophical digressions extremely irritating.

In spite of my criticisms, however, this is a book which, because of its physico-chemical approach, should be read by every marine chemist. Unfortunately, it is unlikely to be of much value to marine biologists because the treatment of biochemical processes in the sea is brief and superficial and, most surprisingly, primary productivity does not seem to be mentioned directly at all.

J. P. Riley

IONIZED ATMOSPHERE

Introduction to Ionospheric Physics

By Henry Rishbeth and Owen K. Garriott. (International Geophysics Series, Vol. 14.) Pp. x+331. (Academic Press: New York and London, August 1969.) 149*s*.

The ionosphere, that vast natural plasma which envelopes the Earth, is the concern of workers in a wide range of scientific disciplines. Over the years, contributions have come from astronomers, physicists, chemists, radio engineers, geomagneticians and others, and a comprehensive account of all aspects of current knowledge of the ionosphere would indeed call for a very substantial volume. The authors of this book are well aware of the problems inherent in writing only about selected topics, and in their preface they set out quite clearly what the book is, and is not, intended to do. The stated purpose is "to discuss the physical processes at work in the ionosphere and to relate them to the observed facts of ionospheric behaviour, without too much detail", and the authors add that the volume is "intended to be useful to physicists, especially graduate students, possessing no great knowledge of the upper atmosphere". A reading of the text confirms that these objectives have been achieved in full.

The subject matter has been grouped into eight principal sections—the neutral atmosphere; ionospheric measurements; photochemical processes; transport processes; morphology; some ionospheric phenomena; geomagnetism and the ionosphere; and storms and their ionospheric effects. Useful tables give, at a glance, orders of magnitude of essential numerical parameters or summary statements on such things as electron production and loss processes, photochemical reactions and ionospheric storm phenomena. A carefully chosen representative bibliography of some 700 documented references is also included. The style and general presentation of the material leave little to be desired and the authors have used wise discretion in deciding the detail with which any particular topic should be treated. In some cases, discussion has been limited because of the uncertain character of current knowledge; in other cases, a subject has not been dealt with in detail because to do so would have upset the general balance of the book. The overall result is a really excellent, authoritative introduction to the subject.

Readers will note that the senior author, Dr Henry Rishbeth, is a member of the staff at the Radio and Space Research Station, Slough, and that his co-author, Dr Owen Garriott, is at the Manned Spacecraft Center, Houston. It may not be generally known that Garriott is, in fact, currently training to be an astronaut. Presently, he will thus have the unique distinction of being the first ionospheric worker to make a first hand acquaintance with his subject.

Bearing in mind the objectives which the authors set themselves, this book can be recommended without reservation.

W. J. G. Beynon

LAWS FOR SYSTEMS

Thermodynamique et Physique Statistique, Premier Cycle

By Bernard Jancovici. Pp. xii+184. (Ediscience: Paris, 1969.) n.p.

This book is designed to provide a simple introduction to thermodynamics and statistical physics. It proceeds from a standpoint of microphysics, and the principles of thermodynamics are presented as consequences of mechanical laws for systems composed of very large numbers of particles. By presenting thermodynamics in this way, the author deliberately avoids a number of sophistries involved in the classical expositions of this subject. In particular, he eliminates the problem of interpreting the entropy concept in terms of purely macroscopic operations.

The book opens with a provisional definition of temperature, based on elementary kinetic theory. This definition is later supplanted by a more generally applicable one, but its introduction enables the author to provide a description of the macroscopic states of matter (phase diagram, van der Waals's equation and the like) at an early stage of the book.

In chapter two, the internal energy of a system is defined in microscopic mechanistic terms. This definition leads directly to the first law. In the following chapter, the entropy of a system is defined as the logarithm of the number of quantum states in an appropriate energy shell; and the temperature is defined as the reciprocal of the partial derivative of entropy with respect to internal energy. These definitions are then used to formulate the Zeroth, second and third laws of thermodynamics. Chapter four is devoted to various applications, at the macroscopic level, of the laws formulated in earlier chapters.

Thus, in the first four chapters, microscopic principles are used for the purposes of defining the thermodynamical variables and formulating the laws of thermodynamics. On the other hand, the fifth (and final) chapter provides an introduction to statistical mechanics proper. This chapter opens with a simplified derivation of Boltzmann's distribution law for a system (possibly macroscopic) in diathermic contact with a thermal reservoir. This law is then applied to relate a number of macroscopic phenomena to the atomic constitutions of the relevant systems (for example, paramagnetism of solids, specific heats of crystals).

The exposition is very clear throughout. I consider that this book should serve as a useful introduction both to thermodynamics and to statistical physics.

G. L. Sewell

DEFORMATION OF SOLIDS

Elasticity, Fracture and Flow with Engineering and Geological Applications

By J. C. Jaeger. (Methuen's Monographs on Physical Subjects.) Pp. viii+268. (Methuen: London, November 1969.) 30*s*.

Professor Jaeger's monograph is a third edition which incorporates without significant change the whole of the first (1956) edition under the same title. It also includes an extended version of the material on rock mechanics that was added in the second (1962) edition, and a substantial new section on applications of the ideas developed