changes that occurred from the Early through the Middle Neolithic. It is apparent that there was an increase of warfare, the development of a more complex exchange system, and only a slight increase in social differentiation.

Tringham has made an especially important contribution for English-speaking archeologists, and the bibliography of her book will be very helpful to any professional archeologist or student trying to pursue further the study of these periods.

As Tringham indicates, much has been accomplished by archeologists in the area with which she deals. Their work forms a base for further research and will make it easier for other archeologists to pursue various studies. Some aspects of archeological research need to receive more emphasis than they have. Currently, most of the accepted hypotheses in European archeology are left untested, and, as in other parts of the world, more testing of models with archeological data is needed. We can observe changes in the archeological record of the European Neolithic, but we would also like to account for these changes in terms of culture process. So far attempts at understanding the operation of the cultural processes have not been very satisfactory. Some archeologists, both of the Old World and of the New World, are now concentrating more and more on these explanatory aspects. This common approach is bringing these archeologists closer together.

SARUNAS MILISAUSKAS
Department of Anthropology,
State University of New York, Buffalo

Cetaceans

Mammals of the Sea. Biology and Medicine. SAM H. RIDGWAY, Ed. Thomas, Springfield, Ill., 1972. xiv, 812 pp., illus. $45.

It used to be that the cetologist who wanted to study live whales and dolphins had to spend many days at sea to obtain even brief glimpses of his subjects. With the proliferation of oceanaria in many parts of the world during the past two decades, the keeping of cetaceans in captivity has become commonplace. Members of 24 of the 34 genera of odontocetes have been kept in captivity, and two—the bottlenose dolphin (*Tursiops truncatus*) and the gray grampus (*Grampus griseus*)—have been bred and reared in captivity. Even among the generally larger baleen whales, members of two of the five genera have been kept in captivity, and a third has been successfully live-captured. The ready availability of captive cetaceans has resulted in a quantum jump in research on their physiology and behavior.

According to the introduction, the present volume was conceived as a much-needed text in the field of marine mammal medical care and husbandry. In execution, the editor considerably expanded its scope. Although all of the 12 contributors are recognized authorities, only 2 are veterinarians, and apparently only 2 others have done extensive research on live captive animals.

The first quarter of the book is devoted to mostly rather brief summaries of the "general biology" of each living species of cetacean, pinniped, and sirenian, and of the sea otter. This material should have been relegated to a separate volume, where it could have received more detailed, critical treatment with adequate literature citations. I think it was unwise to employ an innovative classification of the odontocetes that has not been generally accepted by taxonomists.

The remainder of the book is devoted to anatomy (three chapters), behavior and senses (two), evolution and cytogenetics (one), and parasites (one), ending with a 160-page chapter on physiology, medicine, and husbandry. In general these chapters are authoritative and well written, if not always quite up to date. Some topics receive only a terse general review of the literature, whereas others receive long, detailed treatment including many new data. The uneven coverage is somewhat remedied by an extensive list of references at the end of each chapter.

A more integrated, functional arrangement would have made this book more convenient as a reference. As it is, to obtain information on reproduction, for example, the reader must consult the separate chapters on anatomy, behavior, and physiology. This is facilitated by the exemplary 62-page index. The book has far too many misprints. Biologists, veterinarians, keepers, and trainers who work with marine mammals will find this book one of the most useful sources of information and references.

DALE W. RICE
National Marine Fisheries Service,
Southwest Fisheries Center,
La Jolla, California

Interactions in Solids

Magnetic Resonance in Metals. J. WINTER. Oxford University Press, New York, 1971. xvi, 206 pp., illus. $17.75. International Series of Monographs on Physics.

In 1946, experiments by Purcell and by Block showed that when samples of ordinary materials such as paraffin or water were placed in a steady magnetic field the resulting system could absorb power from the radio-frequency field by "flipping" the nuclear magnetic moments inside the sample from an orientation parallel to the magnetic field (low energy) to an antiparallel orientation (high energy). It was soon realized that the same phenomenon can be observed in a large variety of substances and that the electronic magnetic moments can be induced to do similar tricks. Moreover, it was recognized that nuclear and electronic magnetic moments also interact with each other and with their surroundings. When the surrounding is metallic, for example, the lattice periodicity and interaction between electrons and nuclei can leave a significant and characteristic signature on the shape and position of the resonance signal. A careful study of the resonance data can therefore provide information concerning the magnetic and structural properties of matter. However, because of the wide variety and complexity of interactions present in a solid, there usually exists a gap between the basic understanding of magnetic resonance principles and the actual extraction of useful information from the resonance data.

Magnetic Resonance in Metals attempts to fill such a gap. The book can be divided into two parts. The first part is devoted to the study of nuclear magnetic resonance in metals. After a short summary of basic principles, the author directly proceeds to describe the effects due to quadrupolar and hyperfine interactions between electrons and nuclei. Methods for calculating resonance lineshapes are outlined, and theoretical results are quoted and compared to experimental values. The effects of the same interactions under the condition where long-range order no longer exists, that is, in alloys and liquid metals, are then examined. This is followed by two descriptive and interesting chapters about nuclear resonance in alloys with transition elements and in superconductors. The second part of the book concerns itself with spin resonance of conduction electrons. Treating the problem

of moving spins phenomenologically, the author gives a straightforward account of the effects due to electrons' diffusive motion and related lineshape broadening mechanisms. Comparison between theory and experiments shows that the present understanding of electron spin resonance is by no means complete.

On the whole, the book contains much useful information, but the diversity of the subject and the lack of clear organization make reading rather difficult. The book assumes its readers to be initiated in the field of magnetic resonance. For beginners it is advisable to have a copy of Abragam's *The Principles of Nuclear Magnetism* or Slichter's *Principles of Magnetic Resonance* close at hand for reference.

P. SHENG

School of Natural Sciences, Institute for Advanced Study, Princeton, New Jersey

Atmospheric Phenomena

The Optical Aurora. A. OMHOLT. Springer-Verlag, New York, 1971. xiv, 200 pp., illus. $17.30. Physics and Chemistry in Space, vol. 4.

The Radiating Atmosphere. A symposium, Kingston, Ontario, Aug. 1970. B. M. MCCORMAC, Ed. Springer-Verlag, New York, and Reidel, Dordrecht, 1971. xii, 458 pp., illus. $29.40. Astrophysics and Space Science Library, vol. 24.

Two books on the same subject could hardly differ more than *The Optical Aurora* and *The Radiating Atmosphere*. The first presents a concise and unified synthesis of our current understanding of the optical and spectroscopic aspects of the aurora. The second is a collection of papers of mixed quality and purpose, based on lectures presented at a symposium entitled "Aurora and Airglow, 1970."

In 1961 there appeared the monograph *Physics of the Aurora and Airglow* by J. W. Chamberlain. The physical principles required for an appreciation of auroral problems were presented in that book, and Omholt does not repeat the basic concepts, nor does he discuss the historical aspects of the subject in his compact work. He does provide an up-to-date (1970) description of the physical processes that produce the optical aurora. The emphasis that is placed on physical processes rather than phenomenology is especially evident in the brief chapter devoted to radio aurora and its relation to the optical aurora. The book is not for leisurely reading; it is for the serious student (in a broad sense) of the subject, and provides the sort of quantitative information required for working on current research topics. Key references to original papers are given at the end of each chapter, and there are even references to private communications and to unpublished theses that might not be easy to obtain for many readers. The newcomer to auroral physics will find the book by Omholt and the older book by Chamberlain an excellent combination. The two works are written in a similar style by authorities in the field.

The editor of *The Radiating Atmosphere* has made no attempt to unify the papers assembled in this book. The papers are grouped into eight parts, but the headings of the groups do not provide meaningful descriptions of their contents. The book contains 37 papers, and there is an "institute review" and a highly personal conclusion by the editor and two colleagues. Of the 37 papers I would classify 24 as review papers, a few containing relevant new material. There are 13 papers that present primarily new (and unrefereed) material. In my opinion, these papers do not belong in this book. The good ones will not be read as widely as they would be had they appeared in a standard journal in the field, and the bad ones might never have appeared in a journal at all. One should not, however, allow a few rotten apples to spoil the entire basket; there are some very well written and thoughtful articles in this collection. These include reviews on the airglow, including dayglow, twilight radiations, and the night glow; these subjects are discussed in terms of ionospheric chemistry, where appropriate. The auroral papers cover a wide range of topics: spectroscopic studies, electric fields, particle precipitation, substorm phenomena, radio aurora, x-ray events, and theoretical studies on the formation of aurora. I found the introductory review by D. M. Hunten most informative. In the "institute review," Hunten discusses results reported in the lecture by A. T. Stairs concerning the observation in aurora of a spectroscopic feature at 9.6 micrometers, but I could not find this point in Stairs's paper. Evidently, the written version lost some of the more exciting results reported verbally.

Anders Omholt has left the field of auroral physics; *The Optical Aurora* may be his swan song, a very good one, in my opinion. Billy McCormac's book has been a biennial undertaking on the same subject. First there was *Aurora and Airglow* in 1967, next *Atmospheric Emissions* in 1969, and now *The Radiating Atmosphere*. What will be the title of the next offering on this subject?

MANFRED H. REES

Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder

Organogermanes

The Organic Compounds of Germanium. MICHEL LESBRE, PIERRE MAZEROLLES, and JACQUES SATGÉ. Wiley-Interscience, New York, 1971. xii, 702 pp., illus. $44. Chemistry of Organometallic Compounds.

The authors of this book, all from the University of Toulouse, have produced a most comprehensive account of organogermanium chemistry which includes, in a variety of tables, reference to all compounds described up to 1968. Many references to the 1969 literature are also included.

The text is divided into ten chapters and may be described as acceptably readable, though the nonspecialist will have some difficulty because of the very detailed treatment. The most disappointing part is the introductory chapter (seven pages), where one would have hoped for much more by way of comparative discussion of germanium in relation to the organic chemistry of silicon, tin, and lead.

Each of the remaining nine chapters is devoted to a discussion of the formation and the physical and chemical properties of compounds containing germanium: Ge-C (aliphatic and aromatic); Ge-C (cyclic); Ge-H; Ge-halogen; Ge-O; Ge-S (Se, Tl); Ge-N(P); polygermanes; Ge-metal. Individual chapters are well subdivided and the detailed table of contents is a great help in locating compounds of a given type. The chapters vary in quality: not surprisingly those most closely connected with the research interests of the authors are the most stimulating. The chapter title "Polygermanes" is somewhat misleading, for the chapter includes not only true di- and polygermanes (that is, compounds in which germanium atoms are bound together) but in addition organogermanes such as $(C_2H_5)_3Ge(CH_2)_3Ge(C_2H_5)_3$.

The book contains a fair number of errors, though most of these are trivial