The second half of the book may appeal to a different group, one concerned more with science policy than science. It is an account of the characters who conceived and nourished the ocean business and the scenery—mainly in Washington—in which they acted. The script is copiously annotated with interpretations of the motivations of individuals and organizations. It looks into the mind of the Secretary of Defense and into the collective minds of the aerospace companies looking into his mind—altogether a heady experience. The content of this sometimes theatrical prose consists of hard and hard-won facts which are a credit to the reportorial skills of the authors. Occasionally it seems to me that they go adrift in their history of maneuvering in Washington, but perhaps someone else recalled the events differently for them.

This is an account of little science growing into big science and a scientific revolution that will be welcomed by the specialist for its breadth and by a wider audience for its clarity.

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The Far Infrared

Submillimetre Spectroscopy. A Guide to the Theoretical and Experimental Physics of the Far Infrared. G. W. CHANTRY. Academic Press, New York, 1971. x, 386 pp., illus. $18.

During the past ten years a number of technical achievements such as commercial far infrared interferometers, cheap minicomputers, and simple lasers have made the submillimeter wave region of the electromagnetic spectrum available to specialists and nonspecialists alike. This book aims at both of these groups. A number of research topics are surveyed for the specialist while the simplicity of far infrared spectroscopy is revealed to the nonspecialist. This book begins with a fairly comprehensive account of Fourier transform spectroscopic theory and practice and ends with a detailed description of submillimeter lasers and submillimeter aspects of nonlinear phenomena. A graduate student or researcher with a background in physics, physical chemistry, or electrical engineering should find these chapters quite rewarding. These two topics are separated by a chapter entitled "Submillimetre physics," which definitely does not meet the objectives stated on the book's cover flap: "Every important aspect is discussed, and each topic is illustrated by up to date examples. In short, [the book] is a survey of the field as it appears today." In fact this chapter concentrates on submillimeter wave physics carried out at the National Physical Laboratory. The chapter is still important, however, because it contains a complete record of the contributions made by the "Gebbie group" to far infrared spectroscopy.

What do I recommend? Two things: (i) If you plan to or do work in the submillimeter wave region read this book; it exposes a different and refreshing slice of far infrared spectroscopy; and (ii) destroy the cover flap.

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The Sun's Atmosphere

Physics of the Solar Corona. Proceedings of a NATO Advanced Study Institute, Athens, Greece, Sept. 1970. CONSTANTIN J. MACKRIS, Ed. Springer-Verlag, New York, and Reidel, Dordrecht, Holland, 1972. xii, 348 pp., illus. $28.60. Astrophysics and Space Science Library, vol. 27.

This is pretty good as symposium volumes go. Most of the authors are leaders in the study of the marvelously complex million-degree atmosphere of the sun, and much of the material is new or recent. A good introduction by Evans discusses the new problems. The million-degree plasma is best studied in radio and ultraviolet wavelengths, and good articles by G. Noci and by M. Kundu discuss the various processes involved in producing these emissions. (Yet Noci's second article, on models of the solar transition region just above the surface, is virtually incomprehensible.) The observations from above the atmosphere are given in good articles by Noyes on the Orbiting Solar Observatory data, who covers the extreme ultraviolet, and by Neupert and by Phillips on the spectroscopy of the soft region. These along with an article by Jordan and Wilson on deduction of coronal structure from these observations give a good introduction to analysis of the outer solar atmosphere by observations beyond the visual limits. However, there is nothing about hard x-rays from solar flares or about microwave solar radio emission, which tell us a great deal about the flare phenomenon. Furthermore, there is very little, except in Athay's article on chromospheric structure, on the way these phenomena are connected with the surface and on the way we must face the new challenge of understanding these observations in terms of the fine structure of the sun.

R. B. Dunn presents the results of many years of monitoring the solar corona in the monochromatic radiation of Fe XIV. He definitely establishes that some of the fast coronal changes are produced by flare-associated waves. The structures Dunn observes can be compared with Newkirk's magnetic field deductions presented in his article. However, it is difficult to convince oneself that the predicted fields really agree with the observed structures.

The flare waves themselves are discussed in an interesting article by Smith and Harvey which gives new material that has not been published. It is a pity that a movie cannot be presented in the book to show these magnetohydrodynamic waves moving out through the corona.

There is really a lot of meat in this book if one can only remember to look for it there. But in the end I felt something lacking, with no really comprehensive picture of how the sunspots and plages create the corona, how the magnetic fields mold it, and how the great outward flow to the earth takes place. Maybe this is because the authors are talking to one another rather than to the students.

The production is up to Reidel's usual high standards.

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Beetles

Monographie der Familie Platypodidae, Coleoptera. KARL E. SCHEDL. Junk, The Hague, 1972. vi, 322 pp., illus. 70 guilders.

This volume summarizes Schedl's 42 years of taxonomic contributions to our knowledge of the ambrosia beetle family Platypodidae, which now contains 995 species, 550 of them named by the author. Contrary to the indication in the title, it is not a taxonomic monograph in the usual sense. The outline and organization are essentially the same as those of *Genera Insectorum*.

This is the first major contribution to the systematics of these important tropical woodboring insects since the monograph of Chapuis, 1865, and the catalog and the *Genera Insectorum* generic classification of Strohmeyer, 1914. Because the family has increased fourfold since then this volume will be of great value to systematists, forest entomologists, and others concerned with locating and interpreting the voluminous taxonomic contributions of the author.

Schedl's species concept is entirely morphological; consequently, geographical races are treated either as synonyms or as species while sibling species and most morphological aberrations are listed as subspecies. Much synonymy is overlooked, for example the use of *Diacavus* Schedl, 1933, for *Genyocerus* Motschoulsky, 1858. There are numerous minor editorial errors, a confusing example being the inversion of diagram 2 on Abbildung 12. There is no reference whatever to the Coptonotinae, which are recognized by most workers as a subfamily of Platypodidae, nor is there a response to Crowson's reduction of the Platypodidae to a subfamily of Curculionidae. The introductory topics, particularly those treating geographical distribution, systematics, and phylogeny, are elementary and do not include material specialists in those fields might expect to find in a comprehensive taxonomic work.

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Biological Repair

Molecular and Cellular Repair Processes. A symposium, Baltimore, June 1971. ROLAND F. BEERS, JR., ROGER M. HERRIOTT, and R. CARMICHAEL TILGHMAN, Eds. Johns Hopkins University Press, Baltimore, 1972. xviii, 270 pp., illus. $17.50. Johns Hopkins Medical Journal, Supplement No. 1.

For the most part, the papers in this symposium volume concentrate on repair of DNA and involve various combinations of molecular studies on DNA itself and of studies of recovery of cells from injury, interpreted in terms of repair of this substance. However, one paper on recovery of cells from freezing injury interprets the results in terms of repair of membranes and reminds us that the cell may have other repair systems than those on which most attention is now concentrated.

The symposium brought together many of the most active workers in the field. It is clear that much progress has been made in the last few years. One repair system, photoenzymatic repair, has been developed to the stage where quantitative enzymatic kinetics is possible. Work with dark repair systems is still in the stage of identifying repair systems and enzymes. Several enzymes have been identified with some certainty, however, and work with these enzymes in vitro is becoming possible.

One of the problems in the field continues to be the difficulty of identifying and measuring quantitatively lesions in DNA and associating them with specific biological consequences. Quite a few papers in the symposium involve work with DNA strand breakage. One of the things that come out of reading these papers is the considerable diversity of opinion about the validity of the techniques for measuring such breaks and about their biological significance. Indeed, questions are raised about whether single strand breaks normally have any biological consequences at all.

Despite the emphasis on repair of DNA, very little is said about mutagenic consequences of repair processes. Only a paper on mutagenesis in the mouse deals principally with this topic. This is a difficult problem because of the rarity of the mutagenic event, and it is not surprising that most investigators concentrate on the more easily measured biological end points of cell killing and inactivation.

Altogether this book gives an excellent survey of the present activity in this important field.

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Fossil Proteins

The Biochemistry of Animal Fossils. RALPH W. G. WYCKOFF. Scientechnica, Bristol, England, and Williams and Wilkins, Baltimore, 1972. viii, 152 pp., illus. $19.50.

During the past decade, organic portions of fossil bones and shells have been analyzed to learn if and when these substances have undergone evolutionary changes. This is the principal subject of this book, and the major conclusion is reached that "analyses made of the oldest fossils thus far studied do not suggest that their proteins were chemically any simpler than those now being produced."

Wyckoff well realizes that studies of fossilized organic compounds must first establish the time course of decomposition of collagen and other organic matrices. Unfortunately, when organic compounds undergo fossilization the microscopic mineralized structure does not always change. Thus at the present time possible significant evolutionary changes may be difficult to distinguish from fossilization artifacts. In order to isolate these artifacts, Wyckoff directs particular attention to the vertebrate remains of the Pleistocene Rancho La Brea tar pits, where very few structural changes have occurred in the fossils. In general, however, the amino acids present in fossils are "dominated, not so much by these acids that are plentiful in the initial protein, as by the more stable among them."

In order to evaluate approximately the state of preservation of organic matrices, Wyckoff's laboratory protocol begins with a careful light-microscope examination of each specimen, followed by scanning or transmission electron microscopy or both. The discovery of the essential identity of fine structure in matrices from fossil and from living organisms is documented in 41 excellent figures. Organic matrices are then analyzed by gas chromatography. Most of the 39 tables record the amino acid composition of proteinaceous remains and a few give data on carbohydrates and lipids. Many original data are cited for fossils as diverse as mammalian teeth, dinosaur bones, bird and reptile eggs, fish bones, mollusk shells, and corals.

This well-written book is directed at the interested nonspecialist. A much more complete index would assist a paleontologist in finding the place where his favorite group is discussed (for example, brachiopods and conodonts are discussed in the text but not listed in the index). In general, Wyckoff succeeds very well in conveying the current state of the art of the study of the organic composition of fossilized animals. Unfortunately, only the rich can afford the book.

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