course, that the application of information from these specialties to the hillslope situation may not be entirely correct. For example, we know a great deal about open-channel hydraulics, but we do not know if the direct application of its principles to overland flow is meaningful. Until further research is performed on the hydraulics of overland flow there is no alternative to this approach, however.

Because of the diverse subjects treated, each reader may find minor weaknesses in the presentation of material with which he is most familiar. For example, the authors perpetuate the error of Horton and of Leopold *et al.* (pp. 210–11) in assuming that Renner's data were presented in degrees; he used percentages. In fact, Renner explained that in his area maximum erosion on 35- to 45-percent slopes was due primarily to the activity of cattle rather than to gravitational and hydraulic interactions as assumed by Horton.

Minor problems aside, the work is indispensable for the geomorphology postgraduate student and his professor. Much future research will be based on the authors' comments, criticisms, and conclusions. They have performed a significant service for their colleagues and for anyone concerned with the changing landscape.

S. A. SCHUMM
Colorado State University, Fort Collins

Effects of Plant Substances

Phytochemical Ecology. A symposium, Englefield Green, Surrey, Apr. 1971. J. B. HARBORNE, Ed. Academic Press, New York, 1972. xiv, 272 pp., illus. $15. Annual Proceedings of the Phytochemical Society, No. 8.

This symposium volume consists of 14 chapters by different authors who discuss a great diversity of phenomena ranging from biosynthesis of fungal toxins to feeding habits of gorillas. The common theme is the worthwhile but often elusive goal of unraveling the ecological functions of secondary compounds in plants. Strictly speaking there is not much ecology in this book. The authors are concerned chiefly with chemical structure, biosynthesis, physiology, and behavioral bioassay in the laboratory. Only in a few instances, such as the studies reported here by C. H. Muller and C.-H. Chou and by D. A. Jones, has there yet been any attempt to evaluate quantitatively the significance of chemical adaptations in natural populations or communities, yet this must be the ultimate objective of the chemical ecologist. Muller and Chou compare various mechanisms whereby terpenoid and phenolic compounds are released by certain shrub and tree species, inhibiting the growth of surrounding and potentially competing vegetation. Jones offers a plausible explanation for the observed polymorphic pattern of cyanogenesis in natural populations of some legume species. Deterrence of herbivores favors cyanogenesis in relatively warm and low-lying areas but is offset at higher elevations by risk of autotoxicity due to frost damage or perhaps by higher metabolic costs associated with cyanogenesis.

Growth rates of phytophagous insects may be determined by the concentrations of relatively few key compounds in their food plants. For two aphid species reared on various cruciferous plants, H. F. van Emden demonstrates that quantitative variation between plants of amino acids and of allyl isothiocyanate alone accounts for most of the variation in aphid performance from one plant to another. The great variety of plants attacked by leaf-cutting ants may be attributable in part to novelty-preference behavior (J. M. Cherrett). Miriam Rothschild emphasizes the importance of the visual acuity of bird predators as a factor in the evolution of the feeding habits of many herbivorous insects. Other chapters concerned with the chemical basis of food plant selection by animals are presented here by E. C. Bate-Smith (higher animals), G. W. Arnold and J. L. Hill (ruminants), and T. A. Rohan (chemistry of flavor).

Reviews of the occurrence, toxicity, and metabolism of secondary compounds in plants are presented by A. Shrift (selenium compounds), E. A. Bell (unusual amino acids), A. R. Mattocks (*Senecio* alkaloids), and M. O. Moss (fungal toxins). Though the impetus for much of the research on these and other toxic plant compounds stems from their possible effects on man and his domesticated animals, ecologists are likely to remain frustrated by the relative lack of information (and sometimes even of concern) as to their functions in natural communities.

The book concludes with two interesting chapters on phytoalexins (B. J. Deverall) and on the chemical mechanisms by which seeds of various parasitic higher plants are stimulated to germinate in close proximity to their host plants (W. G. H. Edwards).

This book is full of interesting facts and ideas and can be recommended both as good reading and as a valuable reference source. A useful feature is the inclusion at the end of the volume of an additional index each for all plant species, animal species, and authors cited in the text.

PAUL FEENY
Department of Entomology and Section of Ecology and Systematics, Cornell University, Ithaca, New York

Oceanography Observed

The Great Ocean Business. BRENDA HORSFIELD and PETER BENNET STONE. Coward, McCann and Geoghegan, New York, 1972. 360 pp. + plates. $12.95.

This is an integrated exploration of the scientific, economic, social, and political consequences of the last two decades of explosive growth in oceanography. Its authors are mainly observers of science rather than practitioners, although Stone has a background in geology. They are journalists, scriptwriters, directors, and broadcasters who have personally interviewed many of the diverse groups of people whose work they discuss. From these beginnings they have gone on to original work at the frontiers of the earth sciences. To quote Sir Edward Bullard's preface, "It is one of the attractions of travelling on a rapidly accelerating bandwagon that so many people jump on, and in two or three years one finds oneself among the oldest travellers and a sage in one's own right."

The first half of the book is concerned with continental drift, sea floor spreading, plate tectonics, and the scientific revolution that these special terms identify. The reader is led through a historical sequence from the ancient time (1910–1920), through the period of descriptive groping (1950's), to the integrating hypotheses of the 1960's.

The authors had to leave the bandwagon sometime, and, allowing for reasonable publishing rates, it probably was near the end of 1970. The output of papers on plate tectonics is doubling every two years. Inevitably the aficionado will find some conclusions out of date. The global model of the sea floor, shown in dramatic photos, is an example of a solidified myth. The descriptive groping still continues.

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.

HENRY W. MENARD
Scripps Institution of Oceanography, University of California, La Jolla

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.

A. J. SIEVERS
Physics Department, Cornell University, Ithaca, New York

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.

H. ZIRIN
Department of Astrophysics, California Institute of Technology, Pasadena

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*.