Book Reviews

Planetary Science

Asteroids. Papers from a meeting, Tucson, Ariz., Mar. 1979. TOM GEHRELS, Ed. University of Arizona Press, Tucson, 1979. xii, 1182 pp., illus. $19.95.

During the last decade, most of the publicity about exploration of our solar system has gone to the spectacular discoveries made about the surfaces and atmospheres of the terrestrial planets and, more recently, Jupiter and its satellites. During this time, however, a small but growing number of scientists have turned their attention to the asteroids. This effort to understand asteroids has been to a large extent multidisciplinary, particularly with respect to the relations between meteorites and asteroids.

The extraterrestrial origin of meteorites was originally inferred in 1794, and shortly afterward, in 1803, it was proposed that meteorites came from an exploded planet. The asteroid Ceres was first discovered in 1801; this discovery caused great excitement, for Ceres was thought to be the missing planet predicted to lie between Mars and Jupiter following Bode's law. By the end of the 19th century, some 20 asteroids had been found; but it was not until the mid-20th century that asteroidal studies became scientifically "reputable," and not until the 1970's that such studies developed into a discipline in their own right.

The techniques used to investigate the asteroids were in some cases techniques that had been developed for study of the moon and planets before the days of spacecraft exploration. The use of photometric and polarization measurements to understand the surface characteristics of the moon was well developed in the 1960's, and interpretations based on these data were later tested by the return of samples from the Apollo missions. Scientists interested in these techniques were thus able to turn their attention to the asteroids with more confidence than would have been possible otherwise. They were particularly encouraged by the possibility of future spacecraft missions to the asteroids and the need to develop a scientific rationale to support such missions. The composition of the asteroids became important, and the clear possibility that samples of the asteroids already reside in meteorite collections on earth led to closer collaboration between those interested in meteorites and those interested in asteroids.

As a result of all these studies, there has been an explosion in knowledge of the asteroids. The physical properties of individual bodies have been described, the surface compositions have been interpreted and compared with meteorites, orbits have been defined, and the distribution of different compositional types has been established. Thus we now have a much better data base on which to discuss the origin and evolution of asteroids and relate them to the growing knowledge of the history of the solar system.

Planetary workers can no longer neglect such an important field, and this book is ideally suited to inform all of us of the present state of understanding. It is an important reference for those already established in asteroid research and will certainly stimulate considerable interest among newcomers to planetary studies, since it is the obvious starting point for students embarking on research in this field. Though most of the book, which consists of 41 state-of-the-art papers, may delve too deeply into the subject for undergraduate students, the opening three review chapters—on the history of asteroids by Gehrels, on the nature, origins, and evolution of asteroids by C. R. Chapman, and on the accretion, differentiation, fragmentation, and irradiation of asteroids by L. L. Wilkening—provide excellent reading material for undergraduate courses as well as a substantial basis for understanding the later chapters. The book is strongly recommended to all who concern themselves with astronomy and earth science.

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Ecological Recommendations

Conservation Biology. An Evolutionary-Ecological Perspective. MICHAEL E. SOULÉ and BRUCE A. WILCOX, Eds. Sinauer, Sunderland, Mass., 1980. xvi, 396 pp., illus. Paper, $14.95.

Public awareness of the damage being caused by the increasing assault of humans on the environment has been developing with relatively little input from ecologists doing basic research. This is at least partly because participation in applications of science is discouraged by the academic system of rewards, but also partly because researchers are not especially skilled in making recommendations about what they consider to be very complex systems. But if basic research results are applicable to problems of habitat modification and population regulation it is time for experts in these fields to provide some advice.

Editors Soulé and Wilcox present this volume as a step in that direction. The contributors include scientists in the fields of ecology, behavior, genetics, demography, and natural resources. Their papers treat ecological principles of conservation (part 1), the consequences of insularization (part 2), captive propagation (part 3), and exploitation and preservation (part 4). Interesting new information is provided, particularly in the chapters by Eisenberg on tropical mammals and by Benirschke, Lasley, and Ryder on the technology of captive propagation. But the main impression left with the reader is that scientists will continue to be relatively ineffectual in the conservation movement. At least the recommendations offered here are unlikely to be welcomed by wildlife managers as insightful new findings. And only the last two chapters, by M. Coe and P. R. Ehrlich, treat the larger issue of the relation of the world resource base to the growing human population.

L. E. Gilbert presents an elaborate discussion of the food webs and habitat specializations of tropical insects. Because some insects require both early and late stages of vegetational succession to complete their life histories, he recommends that reserves be designed with the largest possible component of disturbance. On the basis of a discussion of disjunct, "patchy" distributions of birds in New Guinea and other tropical islands, J. Diamond concludes that tropical species are less dense and have more habitat specialization and lower dispersal abilities than temperate-zone birds. No data giving tropical-temperate comparisons are provided, however.