Structural Geology

Folding and Fracturing of Rocks. JOHN G. RAMSAY. McGraw-Hill, New York, 1967. xvi + 568 pp., illus. $17.50. International Series in the Earth and Planetary Sciences.

Recent progress in structural geology has been concentrated in two quite distinct areas: the solid mechanics of rock deformation, and the structural geometry and kinematics of deformed rocks, particularly folded metamorphic rocks. Progress in both areas has been considerable, but interaction between them has been slight. Ramsay's book bridges the gap between the two in the analysis of folds. The broadest area of overlap between solid mechanics and structural studies lies in the study of finite strains, which occupies a large portion of the book. The book contains an extensive introduction to solid mechanics, and is completed by an excellent discussion of the geometry and mechanics of folding.

The discussion of finite strain is exceptionally thorough; the subject is very well handled, and the chapter contains much material that is not available elsewhere. The discussion is complicated because the subject matter is, but it is still lucid and readable. The chapter on the practical determination of finite strain in rocks summarizes a large number of methods, many of them new to me; I hope that it will stimulate more geologists to measure finite strains in the field.

The material on finite strain forms the background for the author's discussion of folds. This chapter (nearly 120 pages long) is the best discussion of folding I know of in the geological literature. A classification of fold types, based ultimately on variations of layer thickness within the fold, is given, and a variety of finite-strain distributions which could produce the various fold types are presented. One of the real strengths of this discussion is that the author does not restrict himself to one or two finite-strain fold models but considers a variety of models. This multiple-model approach is carried over into succeeding chapters on the folding of linear structures and obliquely inclined surfaces. Although folding is approached more from the standpoint of geometry than mechanical origin, existing theoretical investigations of the mechanics of folding are critically discussed, and mechanical considerations are skillfully incorporated in the treatment. The author's work on the geometry of folding will prove invaluable to future workers on the mechanical origin of folds.

My principal criticisms concern the treatments of solid mechanics and experimental rock deformation. The treatment of solid mechanics seems to me to emphasize formal mathematics to the neglect of the underlying physics of the deformation process. For example, in the derivation of the formulas for the stress acting across a plane as a function of its orientation, the use of the principle of the equilibrium of a small volume element under the forces on its faces is never explicitly acknowledged. The relatively abstract mathematical style and the lack of examples using solutions of the partial differential equations of solid mechanics would make it rather difficult to use the book as an introduction to solid mechanics. Only one error of any consequence was found, however: the symmetry of the stress tensor is not dependent on static equilibrium, as is implied on page 283; an asymmetric stress tensor can exist only in a body with internal couples, such as one in a strong electromagnetic field.

The coverage of experimental rock deformation is surprisingly brief. This brevity is a consequence of both the emphasis on continuous deformation rather than faulting and the decision not to treat petrofabrics. Since the experimentally developed techniques for dynamic analysis using quartz deformation lamellae and calcite twin lamellae have yielded interesting results regarding the stress distribution in folds, this decision seems unfortunate.

These criticisms relate mainly to matters of style and emphasis; the topics which make up the bulk of the book are extremely well treated. Supplemented by additional material on solid mechanics and experimental rock deformation, this book would make an excellent text for an advanced course in structural geology. As a reference or text in the more restricted fields of finite strain and folding, it is clearly without equal. It is unfortunate that the price is so high.

WILLIAM M. CHAPPLE
Department of Geological Sciences,
Brown University,
Providence, Rhode Island

Primatology: A Basic Reference Work

A Handbook of Living Primates. Morphology, Ecology and Behaviour of Nonhuman Primates. J. R. NAPIER and P. H. NAPIER. Academic Press, New York, 1967. xiv + 456 pp., illus. $21.50.

This book, the senior author of which is a distinguished primatologist, is addressed to all students of the order Primates, whatever their precise fields of interest. Basically a reference book, it will prove to be of great value not only to professional primatologists but also to workers in collateral fields, such as zoology, anthropology, and medical research.

The data are arranged in three sections. Part 1 deals with functional morphology, presenting an overall survey of the structural, functional, and behavioral characters found within the order. Inasmuch as the primates have adapted themselves to arboreal and terrestrial life in various ways, the limbs are given special consideration. Truncal posture, vision, olfaction, audition, the brain, the dentition and digestive system, placentation, and growth rates also receive attention.

Part 2 consists of useful profiles of the various primate genera. Included are more than 100 truly superb photographs of the animals, which the authors have obtained from numerous sources. The textual data, which are succinctly presented, will no doubt prove to be of great service to a variety of people. They deal with geographical range, ecology, morphology, behavior, reproduction and development, and captivity. Included are a liberal number of references to the pertinent literature, a feature which greatly enhances their value.

The final section, part 3, comprises supplementary and comparative information brought together from many sources. It consists of many useful data concerning taxonomy and nomenclature (including common names from various languages), habitats, limbs and locomotion, macaques (which should have a broad appeal, since these particular primates are widely used for experimental purposes), and vital statistics.

The list of literature is remarkably extensive, consisting of nearly 900 references, all of which apparently are cited in the text. The text also contains numerous tables presenting useful basic data.