many plants it may tell enough about very few. Nevertheless, the references appended to each chapter and the short general bibliography should assist those who may require access to more detailed information. Thus, within the limits set by the author, the book fulfills its objectives in a manner that many general readers and students should find useful.

F. C. STEWARD
Division of Biological Sciences, Cornell University, Ithaca, New York

Inquiring Naturalist

South of Yosemite. Selected Writings by JOHN MUIR. Frederick R. Gunsky, Ed. Photographs by Philip Hyde. Sketches by John Muir. Published for the American Museum of Natural History by the Natural History Press, Garden City, N.Y., 1968. xviii + 269 pp. $7.50.

During the last three decades of the 19th century, a time when the country was firmly committed to rapid industrial development and full utilization of the "unlimited" natural resources of the west, John Muir sought out the secrets and solitude of California's Sierra Nevada. He found what he hoped for and contributed materially to our knowledge of the geomorphic evolution of glaciated mountain areas. However, he also learned of the shortsighted land ethic which has characterized the philosophy of many westerners since the gold rush. He saw the effects of logging practices, still prevalent today, of timber companies which were beginning to feel public pressure for preservation and thus rapidly and indiscriminately cleared forests of thousands of years of growth before the ponderous legislative machinery could move to protect them. He recognized and alerted the public to the problems of long-continued overgrazing by the animals he first went into the Sierra to herd but later called "hoofed locusts."

Unlike many of the vacationers, weekend outdoorsmen, sightseers, and mountaineers who visit the Sierra today, Muir went into the mountains because of a positive desire to explore, observe, and contemplate the natural environment. He did not want to "get away from it all" but rather, although bothered by the lack of sensitivity to nature exhibited by some of the few tourists, hunters, guides, and sheepherders he met, advocated bringing more people to the mountains. In the social and political climate of the times public interest was necessary if parts of the Sierra were to be preserved for future generations.

Sympathetic friends encouraged Muir to bring the wonders of the Sierra to the attention of the nation through his eloquent writing. Beginning in the 1870's, Muir published articles in such national monthlies as *Harper's, Scribner's*, the *Atlantic*, and the *Overland*. These articles, and the manuscript correspondence associated with them, serve as the foundation for the text of this new book. The writings have been sympathetically edited by a former editor of the *Sierra Club Bulletin*. In later years, Muir himself edited many of his articles to produce a series of popular books, but, by drawing on the original sources and contemporary newspaper and manuscript articles, the editor conveys much more of the flavor, charm, and immediacy of Muir's first writings.

Books about Muir and ones that use his writings to accompany photographic presentations are numerous, and many are excellent. This book differs from others in that its main purpose is to present John Muir himself, through his writings, as an inquiring scientific naturalist, a gifted if rather romantic writer, and a conservationist. The book is highly successful. The plates, by an able and renowned photographer, have been carefully selected to complement the text rather than the reverse. Unfortunately, the quality of the reproduction of the black-and-white plates is not equal to the standards of readers accustomed to Sierra Club or most other volumes of that format. Editorial annotations include background information on the original sources and historical context of the selected passages and footnotes updating taxonomic nomenclature and place names.

Unlike previous volumes on Muir, this book focuses on writings of 1872 to 1912 dealing with the part of the mountain range south of Yosemite National Park. His descriptions of his ascents of Mount Whitney and Mount Ritter and his exploration of the southern "yosemite" of Tehipite Valley offer some of the best examples of his gently persuasive reasoning, in particular his arguments that ice was the chief agent of erosional modification of the landscape. The giant sequoias of the southern Sierra, whose ecology Muir studied, prompted writings on their esthetic nature and great age and the need for conservation. Out of this writing grew efforts that resulted in the preservation of many remaining isolated stands in Sequoia and Kings Canyon national parks. It was during Muir's travels south of his Yosemite home that he wrote some of his most charming and able descriptive vignettes —for example, of the water ouzel, the Sierra bighorn, and the theft of his teapot lid by a wood rat.

For the general reader, Muir's perception of ongoing geomorphic processes, his descriptive prose, and his insight into conservation problems make this book enjoyable and timely. For those who are interested specifically in the Sierra Nevada, his early impressions serve as a base line on which to measure the changes that have come about between his time and today, when one may see fishermen standing elbow to elbow at a High Sierra lake on the Fourth of July or be awakened on a frosty morning 40 miles from the nearest road by a low-flying helicopter dangling a freshly painted National Park Service outhouse to serve the throngs of city-bred visitors.

ROBERT R. CURRY
Department of Geography and Environmental Sciences, University of California, Santa Barbara

Metabolism

Protein Nutrition and Free Amino Acid Patterns. Twentieth annual conference of the Rutgers University Bureau of Biological Research. JAMES H. LEATHEM, Ed. Rutgers University Press, New Brunswick, N.J., 1968. 227 pp., illus. $10.

Publication of a collection of papers in book form four years after the conference at which they were presented is, in this case, worthwhile, although the delay is regrettable. The 13 contributions provide a good starting point for knowledge of the subject, but their authors and other investigators have made important additions to it since the time of the conference.

J. M. McLaughlan, Selma E. Snyderman, L. E. Holt, and their respective co-workers assemble convincing evidence that plasma amino acid distribution in experimental animals and man is altered by the quantity and quality of dietary protein. This is made more significant by Q. R. Rogers and A. E. Harper's demonstration that plasma amino acid concentrations do reflect what is happening in liver and muscle.

H. N. Christensen summarizes his experimental evidence for three distinct

systems for the transport of different groups of amino acids, and S. J. Gray and collaborators present the first proof that these systems operate in man. It is evident from their work, however, that normal transport capacity across the intestinal wall is far in excess of the quantities of amino acids obtained from food.

D. H. Elwyn's discussion of the modification of plasma amino acid patterns by the liver, Wool and Scharff's description of the effect of insulin and diabetes on amino acid transport in muscle, and H. N. Munro's masterly Allison Memorial Lecture are particularly useful. Munro analyzes the evolutionary differences between rat and man in a way which rationalizes the differences in amino acid metabolism and its response to diet in the tissues of these two species. A. Lajtha and co-workers' finding that different regions of the brain vary in free amino acid pattern and amino acid uptake has already stimulated research on the origin of these differences.

The usefulness of the book for its intended audience of research workers in related fields would have been improved by inclusion of some of the discussion which took place at the conference and by an index.

NEVIN S. SCRIMSHAW
Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge

Nuclear Motion

Collective Models of the Nucleus. J. P. DAVIDSON. Academic Press, New York, 1968. xiv + 238 pp., illus. $12. Pure and Applied Physics.

In the study of collective models of nuclear behavior, attention focuses on modes of motion such as the rotation of the nucleus or the vibration of the nuclear surface, which clearly require the cooperation of a large number of individual neutrons and protons. In the original formulation of such models by A. Bohr and in their development by Bohr, Mottelson, and their collaborators at Copenhagen, a liquid-drop analogy played a fundamental role, both suggesting the general forms of the phenomenological analysis and providing provisional estimates for some of the constants (collective parameters) occurring therein. It has since been realized that the general form of the collective models is quite independent of the hydrodynamic underpinning. Moreover, much deeper theories of the collective parameters, based on the shell model, have been developed to supplement or replace the more naive classical estimates.

To the practicing nuclear theorist, these developments have meant that he could conceive and enjoy a passion for the concepts of collective motion within diverse traditions. J. P. Davidson is mainly known for his assiduous efforts in developing the consequences of the purely phenomenological theory. This is an essential task. For nuclei in the range of atomic numbers $150 \leq A \leq 190$, $A \geq 225$, the so-called deformed regions, the attendant nuclear model is the most precise and successful one we have. It is based on a picture of the nucleus as having an ellipsoidal shape which can slowly rotate. At somewhat higher excitation, the surface can vibrate, preferentially preserving the ellipsoidal symmetry, though more complicated (octupole, hexadecupole, and so on) modes of vibration and individual nucleon degrees of freedom may also manifest themselves. Only recently have experimental results become sufficiently precise and extensive to permit a careful study of the mutual influence of the rotational and vibrational degrees of freedom.

Davidson's monograph is a more than adequate presentation of the concepts and results necessary for the understanding of these developments. It is the only essentially complete account of the purely phenomenological part of the theory to appear between hard covers, though several review articles of comparable quality, including a fairly recent one by Davidson himself, are to be found in the periodical literature and as parts of larger studies. Excepting the influence of the collective degrees of freedom on nuclear reactions, all important topics are at least mentioned. The treatment of fundamentals is concise, thorough, and noticeably lacking in pedantry.

Despite its virtues, *Collective Models of the Nucleus* lacks any sense of excitement. Partly this is due to the author's deliberate exclusion of the microscopic parts of the theory. (Though he cites monographs which include accounts of the latter, these are equally monolithic in *their* interests and equally lacking in perspective.) Another deficiency is the tendency to treat the hydrodynamic prediction of parameters too seriously. The impression this leaves is heightened by the absence of any real moderating influence of more recent theories. For these reasons the volume can be recommended without reservation only to the experienced worker who can supply his own perspective and for whom it can serve as a most useful compendium of results and as a source of references. The neophyte can benefit from many excellent accounts of details of the subject, but will need outside help to emerge with anything deeper and broader.

ABRAHAM KLEIN
Physics Department, University of Pennsylvania, Philadelphia

Helium outside the Laboratory

Technology of Liquid Helium. R. H. KROPSCHOT, B. W. BIRMINGHAM, and D. B. MANN, Eds. National Bureau of Standards, Washington, D.C., 1968 (available from Superintendent of Documents, Washington, D.C.). x + 374 pp., illus. $2. NBS Monograph No. 111.

This book appears just 100 years after the discovery of the element helium. Unlike most books on liquid helium, which concentrate on the remarkable physical properties of this fluid and their bearing on some of the most fundamental problems in physics, this book attempts to present a detailed basic discussion of the technology associated with large-scale production, storage, and use of this cryogenic medium.

The two most striking developments associated with the technology of liquid helium over the past two decades are, undoubtedly, the "Collins cryostat" and the vast use of cryogenic fluids in the space program. The Collins cryostat, by putting liquid helium within the reach of virtually every physicist, led to an enormous increase in the amount of experimental research conducted at very low temperatures. The demands of the space program, on the other hand, led to a concentrated attack on increasing helium production from natural-gas sources and on techniques of refrigeration, distribution, and handling. The tremendous impact of these developments is apparent in each chapter of this book.

Eight chapters, written by a number of specialists, including Samuel Collins,