

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.

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## 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 collec-

tive 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.

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## 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,

discuss in considerable depth various aspects of the production and use of liquid helium. The chapter on helium resources, production, and conservation by William Deaton and Paul Mullins, of the Bureau of Mines, is indeed a mine of information for the general reader. The roles of the U.S. government and private industry in the history of helium production provide perhaps a classic example of government pioneering followed by the emergence of industrial interest as a result of national demand. The last two chapters, on cryoelectronics and applications, are less extensive and aim to give the general engineering reader some idea of the scope, use, and possible areas of future development of cryoelectronic devices.

This monograph serves as an excellent source document on helium technology in all areas other than those associated with the present-day use of liquid helium in the low-temperature research laboratory. There is no mention of the technology associated with the temperature range below the helium boiling point (approximately 4.2°K), of superfluidity, of liquid He<sup>3</sup>, or of the rapidly emerging millidegree technology associated with He<sup>3</sup>-He<sup>4</sup> mixtures. Considering the remarkable strides taken in the development of a liquid-helium technology over the past 20 years, it is surely not too fanciful to expect a similar development with respect to the technology associated with the temperature range below 4.2°K. Perhaps in 20 years' time, or less, this development will form the basis of a new source document on helium technology in this NBS monograph series.

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## Ethnic Artwork

**Southwest Indian Craft Arts.** CLARA LEE TANNER. University of Arizona Press, Tucson, 1968. 206 pp., illus. \$15.

This is a book for laymen and specialists alike, by an authority on the handicrafts of two dozen or more ethnic groups throughout southwestern United States. By words, drawings, and selected photographs it depicts pottery, basket and textile weaving, and the manufacture of personal ornaments as family activities from remote times. It shows,

too, how techniques find a way from tribe to tribe.

Author of the informative and popular *Southwest Indian Painting*, published in 1957, Tanner knows her subject in its every detail. A member of the anthropology faculty of the University of Arizona for 40 years, she has traveled throughout Arizona, New Mexico, and bordering states, finding her informants in their own homes and brush shelters, surrounded by their families, young and old. Her information is abundant and richly illustrated with superb photographs and analytical drawings that portray in the clearest manner methods of manufacture and differences in decoration within a single tribe and from one group to another.

The author has been particularly successful, in this reviewer's opinion, in depicting craft changes that have taken place within the last two generations. This presentation is especially important for those ethnologists who study culture in all its ups and downs. Old styles, methods, and materials have been abandoned or forgotten. Fluctuating tourist demands are often blamed, although this fact is not emphasized in the present volume. Navajo weaving and silversmithing, for example, have changed to keep pace with the whims of retail buying. Double, two-faced, and "tufted" blankets are rarely woven today. Each area of production has its own distinctive patterns; full-width designs have been replaced by those with borders, and the so-called "ceremonial" or *yei* blanket has become increasingly popular for its decorative qualities. Efforts to revive vegetal dyes have been generally unsuccessful. Like his white counterpart, the Indian craftsman wants a quick turnover and a quick sale.

So, too, with basketry and pottery. Guided by drawings showing every twist and turn and by unusually clear photographs, the reader will have little difficulty in distinguishing between Apache and Navajo basketry, for example, or between the wickerwork of Hopi weavers and their Pueblo relatives from the Rio Grande. Likewise, superb illustrations and knowing descriptions trace the evolution of earthenware products from the regional wares of pre-Spanish times to those of the present. Here design form and method distinguish the products even of neighboring villages. Here, too, fancies of the passing tourist are evidenced in some localities more than in others.

Silversmithing, presumably introduced from Mexico in about 1800 and immediately adopted by the Navajos, has more recently spread to other tribes. The Zuñi, for one, have been exceptionally alert to commercial possibilities and now offer bracelets, rings, and necklaces of clustered and minute machine-ground turquoise they purchase by the quart.

Altogether, Tanner has produced in the present volume a work of lasting value. And this reviewer, for one, also applauds the University of Arizona Press for a magnificent job of printing.

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## High Polymers

**Characterization of Macromolecular Structure.** Proceedings of a conference, Warrenton, Va., 1967. National Academy of Sciences, Washington, D.C., 1968. x + 410 pp., illus. \$15. NAS Publication No. 1573.

The papers in this volume were presented at a three-day conference concerned primarily with methods of polymer characterization that are applicable to a variety of macromolecules and that can be used on commercially available instruments. No attempt was made to cover the entire field of polymer characterization. The volume includes both reviews of previous work and short notes on current work. If any discussions took place, they have been omitted.

The subjects covered include molecular-weight determinations by ebulliometry, membrane osmometry, light scattering, small-angle x-ray scattering, and sedimentation-equilibrium experiments. Papers by Coll and Stross and by Elias provide excellent reviews of the latest developments and problems in membrane osmometry. The separation of macromolecules according to size or shape and the determination of molecular weight distribution are well covered. A critical review of solubility phenomena is given by Allen. Fractionation techniques are also discussed, and Moore's short, concise review of gel-permeation chromatography is well written and well referenced. Part of the proceedings covers the characterization of polymers by transport phenomena such as vapor-phase osmometry as well as the determination of