A New Method in the Theory of Superconductivity. By N. N. Bogoliubov, V. V. Tolmachev, D. V. Shirkov. Translated from Russian. 121 pp. Consultants Bureau, Inc., New York, 1959. $5.75. *Reviewed by R. Bruce Lindsay, Brown University.*

SUPERCONDUCTIVITY has long presented a fascinating challenge to the theorist and numerous theories have come and gone. The authors of the present volume date the beginning of real success in understanding this phenomenon to the suggestion of H. Fröhlich in 1950 that the explanation must be found in a study of the interaction between the electrons and the lattice phonons. More recently Bardeen, Cooper, and Schrieffer have made considerable progress along these lines. The book under review describes in detail an even more ambitious attempt to solve the problem in the form of a generalization of a method developed in 1947 by Bogoliubov, who formulated a microscopic theory of superfluidity. The application of his ideas leads to results of which the Bardeen, Cooper, and Schrieffer theory is a first approximation.

The treatment is highly technical throughout and except for the introductory chapter will be intelligible only to the expert in quantum mechanics.

Absorption and Dispersion of Ultrasonic Waves. By Karl F. Herzfeld and Theodore A. Litovitz. 535 pp. Academic Press Inc., New York, 1959. $14.50. *Reviewed by Stuart A. Rice, Institute for the Study of Metals, University of Chicago.*

THE diminution in intensity of the amplitude of a planar longitudinal wave traversing a liquid is, neglecting radiation losses, caused by the conversion of the organized collective motion of the sonic pulse into random thermal motion. The total attenuation may be separated into contributions arising from thermal conductivity and viscous loss. This latter contribution is itself separable into two components: that due to shear viscosity and that due to dilatational viscosity. Although for monoatomic fluids the only contribution to the dilatational viscosity arises from collisional transfer of momentum, for polyatomic fluids the dilatational viscosity can be related to intramolecular relaxation phenomena as was first demonstrated by Tisza. The major purpose of the book by Herzfeld and Litovitz is to interpret sound absorption data in terms of suitable molecular models for intramolecular relaxation. The treatment presented is admirably clear and is comprehensive from both the experimental and theoretical points of view. There are good reviews of the various model theories of viscosity as well as the theory based on autocorrelation functions, but the more detailed approach of Kirkwood is treated cursorily. Multistate models are considered in some detail. In the interpretation of absorption both multistate models and solution of the Navier-Stokes equation with frequency-independent parameters are discussed wherever appropriate. (The latter for monoatomic gases.) Of particular value is the chapter dealing with associated liquids, the structural relaxation relevant to sound absorption, and the relationship to dielectric relaxation. In view of the increasing use of ultrasonic techniques for the investigation of condensed phases, the publication of this book is timely and important. It may be wholeheartedly recommended to all physicists and chemists interested in the structure of condensed media and will be a valued addition to any individual reference shelf.

Paris Symposium on Radio Astronomy (July–Aug. 1958). Sponsored by IAU & URSI. Edited by Ronald N. Bracewell. 612 pp. Stanford U. Press, Stanford, Calif., 1959. $15.00. *Reviewed by E. J. Öpik, University of Maryland.*

THE young science of radio astronomy is still in the making. The Paris Symposium provides a review of the problems and progress in this field, in the form of individual contributions welded together by introductory and concluding lectures. The proceedings cover the planetary, solar, interstellar, extragalactic, and cosmological aspects of radio astronomy presented in 107 observational and theoretical invited papers. As typical of a rapidly developing science, there are more problems and questions than solutions and answers.

One reason why the interpretation of radio results is often vague or ambiguous lies in the resolving power; for radio telescopes it is by many orders of magnitude lower than for optical telescopes. This disadvantage is only partly compensated by the very much better power sensitivity of the radio. Radio techniques may discover faint signals from sources "on the edge of the universe", yet the shape, exact position, and nature of these sources may remain a mystery.

To give an idea of the contents, a few outstanding results may be mentioned. Radar observations show that the lunar surface has specular reflecting properties for wavelengths of 10 cm to 3 m, indicating a generally smooth surface except for the small-scale graininess of sand or dust responsible for the diffuse reflection of visible light. At the same time the surface is never horizontal, its average slope being about 3°. The density of the lunar atmosphere is less than 10^{-13} of the terrestrial. The unexpectedly high radiation temperature of Venus in the microwave range is confirmed. The temperature in the solar chromosphere increases from 5500° K at 5000 km to 700 000° K at 30 000 km above the surface, and in the lower corona at about 150 000 km it reaches 3×10^{6}° K. Some galactic radio sources are optically identified as possible remnants of supernovae, still expanding with velocities of about 7500 km/sec. Radio diameters of galaxies are considerably greater than their optical diameters, indicating extended gaseous envelopes. There are considerable amounts of hydrogen in some galactic clusters and in high galactic latitudes. The survey of neutral hydrogen in 21-cm radiation yields new details of the spiral and disk structure of the Milky Way galaxy. Hydrogen gas is flowing out from the galactic nucleus with velocities of 150