Russian Neurophysiology

Sensory Processes at the Neuronal and Behavioral Levels. G. V. GERSUNI, Ed. Translated by Jerzy Rose. Academic Press, New York, 1971. xiv, 332 pp., illus. $18.

Materials for translations continue to be chosen erratically, and the scientist without knowledge of Russian must be grateful for any translation that helps to fill in his spotty picture of Soviet work in his field. Here, for the sensory neurophysiologist, is a volume of 17 papers that grew from a symposium held at the 18th International Congress of Psychology in Moscow in August 1966. With the exception of Bureš, Hicks, Jung, and Katsuki, the contributors are Soviet researchers, the majority from the Pavlov Institute of Physiology in Leningrad. About a quarter of the volume is devoted to matters of vision, the rest to audition. Most of the papers deal with aspects of single neuron firing patterns in mammals. Evoked potentials and psychophysics receive relatively scant attention.

Overall reviews of the visual and auditory systems are provided respectively by Jung and Gersuni. Gersuni's paper, entitled "Temporal organization of the auditory function," is a particularly good guide to the work of the Leningrad laboratory; this work is developed in considerably more detail in six further papers. Gersuni makes a case for logical division of the auditory function and of the properties of auditory neurons into mechanisms with long and with short time constants. Neurons involved in the short time constant mechanism are found throughout the auditory system and, according to Gersuni, may involve discrimination of spectral properties in short sounds or in transients. The long time constant mechanism may involve sensation of pitch and, in contrast to the short time constant functions, is not harmed by ablation of primary auditory cortex.

In another interesting paper, J. A. Altman examines effects of binaural click stimulation on neurons of the inferior colliculus. There is agreement with results of the Wisconsin group regarding the effects of time or intensity differences between stimuli to the two ears. Moreover, Altman delineates the sensitivity of some neurons to movements of the sound source in particular directions.

A. V. Popov offers a review of the peripheral auditory system of some insects. It is particularly useful for the sensory neurophysiologist who works with mammals to be reminded of the extent to which relatively simple auditory systems can solve the same detection and discrimination problems.

The extensive bibliographies include translated titles in all references to the Russian literature, and should be a valuable aid to further literature search and to further translation projects. There are thorough subject and author indexes. The translator has made this a highly readable and useful volume.

GEORGE L. GERSTEIN
Department of Physiology, University of Pennsylvania, Philadelphia

Plasma Physics and Chemistry

Reactions under Plasma Conditions. M. VENUGOPALAN, Ed. Wiley-Interscience, New York, 1971. 2 vols. Vol. 1, xiv, 600 pp., illus. Vol. 2, xiv, 608 pp., illus. $29.95 each volume.

The stated purpose of this massive work is "to correlate in [a] single book . . . the bulk of information currently available on both the physics and chemistry of plasmas, together with the necessary theoretical and experimental background." The purpose of this review is to question the practicability of such a task, and even its desirability in the light of other available resources, and to call attention to some excellent specialized material in the volumes that is in danger of being swamped by the generality of the effort.

Because of its size, and a rather clear distinction of subject matter, the book is presented in two volumes, the quality, disposition, and importance of which are rather different. The first volume, presumably intended as background material for the plasma chemistry of the second, consists of a collection of surveys of various topics in plasma physics, prepared by several authors with widely differing styles. The resultant compendium is rather lumpy, ranging from sketchy, elementary, and too often superficial reviews of fundamental material on particle collisions, electrical discharge phenomenology, and plasma diagnostic methods to much more substantial discussions of the thermodynamics and transport properties of plasmas. The contributions on these last two topics, by H. W. Drawin, extend for some 230 pages and comprise a worthy monograph which may redeem the entire volume. For the remainder, my preference would be to send the reader directly to the primary sources from which most of the material has been rather directly extracted, for example, the classics of Spitzer, Langmuir, Loeb, and von Engel and the more detailed technical handbooks of Griem, Heald and Wharton, and others. With such references on adjacent shelves of one's library, I can see little virtue in a collection of reviews and digests under one cover, unless it is prepared by a single author in such a way that a clear thread of logical relevance is carried through to the central material to follow. Such is not the case here.

The second volume, concerned largely with chemical and physical reactions in plasmas, seems to me a far more worthwhile enterprise, better conceived and more effectively implemented. Of the various technological applications of plasma phenomena, plasma chemistry is probably the most complex, the least developed, and very possibly the most rewarding, not even excluding fusion power generation. The slowness of its growth probably derives from some combination of that inherent complexity, the recent depression of government research in plasma areas, and a dearth of scientists with substantial backgrounds in both classical chemical kinetics and plasma physics. Few texts address the educational task, and most of the existing experience is widely scattered in obscure reports. Volume 2 is a good attempt to fill some of this void.

Following a superficial, but short, introduction, and some collision phenomenology somewhat repetitious of material in volume 1, there appear well-written sections on reaction kinetic methods with honest acknowledgments of their limits of applicability, useful surveys of existing studies of chemical reactions in various electrical discharges, and a highly informative review of the use of plasma jets for chemical synthesis. Chapters on plasma chemistry in flames, the exotic domains available in shock-wave-generated plasmas, and radiation-produced plasmas are equally exciting, particularly in terms of the unexplored possibilities they suggest. In short, the second volume, unlike its predecessor, qualifies as an effective attempt to correlate experience and thought in a promising technological infant.

ROBERT G. JAHN
School of Engineering and Applied Science, Princeton University, Princeton, New Jersey