ticipants "just happened" to have slides handy. In any case, many new data were added from the floor.)

Careful studies of the ultrastructure of the pineal gland of a variety of species by Kelly, Collin, Oksche, Arstila *et al.*, and Pellegrino de Iraldi add new descriptions and data to old on the development of the pineal and its evolution from a sensory to a secretory organ.

A shortcoming of this symposium is that the generally excellent recent work of W. B. Quay, who has contributed so much to the anatomy and physiology of the pineal, was not presented or even discussed. Nor was C. L. Ralph present to describe his recent work utilizing a direct bioassay of melatonin. Further, the influence of the pineal on melanocyte physiology in lower vertebrates and the interrelation of melatonin and melanocyte stimulating hormone were not considered. These are broad topics of general interest and importance.

In spite of the wealth of new information contained in this publication, it is quite apparent that the pineal gland still offers something for everyone, and its potential is expanding, as is its literature. In this particular volume, the formal presentations are well introduced and well documented and smoothly combine old and new information, and the discussions that follow each are superb. The publication lag is slight and the price reasonable. This volume will serve well both students and professionals from a variety of disciplines.

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Soviet Neuroscience

Electrophysiology of the Central Nervous System. V. S. RUSINOV, Ed. Translated from the Russian edition (Moscow, 1967) by Basil Haigh. Robert W. Doty, Transl. Ed. Plenum, New York, 1970. xii, 516 pp., illus. $37.50.

This volume of 34 short papers is basically a festschrift for M. N. Livanov, a leading Soviet electrophysiologist, that appeared originally in Russian in 1967. In providing a compendium of representative work or reviews by 24 Soviet neuroscientists, it has the clear value of augmenting our too-limited acquaintance with Soviet efforts in this field. The other contributions are from Western authors or groups or others who regularly publish in Western journals—Adey, Andersen, Buser, Brazier, Doty, Grastyán, John, Purpura, Remond, and Yoshii—and of these only Buser, Grastyán, and the Yoshii group (Hori, Toyohara, and Yoshii) have presented here data that may not be readily available elsewhere.

Twelve of the papers are concerned with studies of single neural units and related matters. In six of these the focus is on the analysis of the generation of unit activity, and EPSP's, IPSP's, and dendritic potentials fly thick and fast. I found these papers attractive and interesting (Andersen and Lømo's is especially clear) and a relatively painless way to gain some familiarity with the work of leading contributors, both Western and Soviet, to the subject. A review of ephatic (non-synaptic) transmission by Belenkov is well done. Functional properties of the unit are considered in three papers and the study of single units in conditioning and habituation in another three.

The main bulk of the volume (18 papers) concerns the electroencephalogram, and no less than ten studies involve in part at least the encephaloscopic technique developed by Livanov (and independently by Gray Walter). The method is designed to evaluate changes in EEG wave amplitude simultaneously in different areas of the brain and requires the use of fairly sophisticated computer techniques. It is presumed to provide a way of studying the actual concurrent participation (synchronism or synchronization) of different cerebral areas in learning, sensory processing, and other critical functions of the brain. Livanov and his associates have applied the synchronism technique to everything from the study of early conditioning in rabbits to human psychopathology. The auto- and cross-correlograms of Brazier and Barlow, Adey, and Walter and the temporospatial potential maps of Remond are related techniques and are represented as well. But the Russian scientists have achieved a sputnik of sorts in a report by Aslanov of the intercorrelations (1225) among 50 cortical areas through scalp electrodes in man. The analysis of multiple channels of EEG information has developed rapidly in recent years, but the techniques, Soviet and Western, have seemed to lead by some considerable distance the demonstrated utility. It is not clear, generally, what the masses of intercorrelations, correlograms, and isopotential maps are telling us about structure, function, or pathology. The single-unit studies (with the built-in sampling bias that all recognize) seem clearer somehow; the complexities of neural transmission, generation of the macropotentials of the EEG, and the physiopathology of epilepsy are beginning to be unraveled. But I believe that we should continue to support macroprocessing efforts, at least on a modest scale, until there is a chance to see more evidence of their predictive or interpretative value. Some promise of future payoff is provided, perhaps, in the daring and imaginative Soviet attempts to apply these techniques to such problems as obsessive neuroses (Aslanov) and to schizophrenia and epilepsy (Gavrilova *et al.*). The findings, based on small numbers of cases, must be called suggestive rather than convincing; further, the problems inherent in monopolar recording against a supposed "indifferent" reference are not dealt with. One would wish also for a standard EEG evaluation in such patients of such phenomena as diffuse abnormality, presence of spike or slow wave foci, bilaterally synchronous slow waves, and the like in order to anchor to some extent the analysis of "synchronisms." One does note satisfying evidence of critical evaluation of the phenomenon, however; Zhadin's biophysical analysis suggests that synchronization does not inhere in nerve tissue itself but is a result (artifact?) of properties of conducting media such as cerebrospinal fluid, bone, meninges, or the electrodes themselves. Other papers of more than passing interest within this group include a traditional but satisfying study of thalamocortical relations by Narikashvilli *et al.* and a scholarly analysis of the effects of blindness on occipital alpha rhythms by Novikova.

Of the four miscellaneous papers remaining, the one of special interest is that of Buser *et al.*, which appears to settle the question of the origin of "hypnotic" akinesia in the rabbit.

In summary, I must say that I found the book of considerable value; although the pieces are generally short and sometimes lacking in detail, the taste of Soviet neuroscience that it provides is both satisfying and stimulating.

Criticisms leveled in past years (crude technique, absence of statistical evaluation, irrelevant references to Pavlov and to the state) seem largely inapplicable to this collection. If one wants a pleasant introduction into modern Soviet neuroscience, and the names of some investigators that are worth the trouble to follow, this work will supply both. The book is attractively printed and the illustrations are of good quality. The translation is competently done, so far as I can tell. I must also express my appreciation to Livanov for having provided the occasion for this publication.

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Molecular Electronic Spectra

Low Temperature Spectroscopy. Optical Properties of Molecules in Matrices, Mixed Crystals, and Frozen Solutions. BEAT MEYER. Elsevier, New York, 1971. xii, 654 pp., illus. $33.50.

It possibly would have been a mistake for Meyer in his *Low Temperature Spectroscopy* to be too meticulous about historical priorities in this field. In the first place, almost every physical chemist, photochemist, or solid state physicist has found himself doing a low temperature spectroscopic experiment at some time or other. In the second place, the numerous streams of low temperature research in optical spectroscopy have frequently isolated themselves from one another, not by virtue of any serious differences in cryogenic technology but simply because some workers have been interested in atoms, others in large molecules, others in *d*- and *f*- electrons, others in free radicals and unstable molecules, others in molecular crystals, and still others in semiconductors, and so on. It would therefore be a monumental operation to present a detailed account of the history of low temperature spectroscopy. Although Meyer has made a modest attempt at providing this background, only the part on matrix isolation spectroscopy of small molecules seems adequately researched.

Most of the book is concerned with just a narrow part of low temperature spectroscopy, and Meyer's term "cryochemistry" might have been a more appropriate title for a book that deals with mainly molecular electronic spectra and avoids the temptations to explain much of the physical meaning either of the spectra or of their modifications due to the states of the various matrices in which the molecules are studied. These matrices are organic glasses, vapor-deposited matrices of small molecules or atoms, and mixed crystals. Inert matrices are the author's specialty, and the book is best in the parts dealing with them. Meyer is also at his best in the purely experimental chapters, when he is giving us advice about buying equipment, finding the proper gaskets for cold windows, or how to avoid explosions of liquid helium dewars and numerous other useful hints for the effective running of a cryogenic laboratory. An additional practical feature is the set of useful tables of physical properties for common matrix materials, including glasses and plastics. The only ground rules are that the sample not consist of a neat ionic or molecular solid and that the temperature be less than 100°K.

Although the book contains 654 pages one finds that some 280 of these are occupied by a tabulation of spectral data on atoms, diatomics, and triatomics mostly in inert matrices, and organic molecules in glasses, mixed crystals, and crystals and by some 2200 references to low temperature spectroscopic work on molecules and free radicals. The data on atoms through triatomics are presented in a form similar to that used in Herzberg's compilations (*Electronic Spectra of Polyatomic Molecules,* Van Nostrand, 1966) of gas phase molecular spectra: The energy of the 0,0-band, the vibrational frequencies, and the nature of the electronic state are presented, but intensity data are excluded. Meyer has used a similar but less detailed method in tabulating information on polyatomics ("poly" means greater than or equal to four, according to Meyer, but does not include organic molecules) and organic molecules. Since there are so few definite assignments for electronic and vibrational states of larger molecules the average worker might have wanted to use tables of this sort for no other reason than to find the wavelengths of light that a molecule absorbs and emits, the intensity of these processes, and who has previously worked on low temperature spectra of that molecule. For most molecules Meyer has given only a single wave number [as $(E/hc) \times 10^{-4}$ μm^{-1}], corresponding to the energy of a feature of just one of the electronic states of the molecule. Frequently these numbers are 0,0 band energies, although this is never stated, and for many of the molecules in the tables even such an identification would be questionable.

It would have been especially useful to have more information on such things as the approximate width of spectra at various temperatures, the extent to which vibrational structure is developed in different matrices, and absorption intensity. The tables do include emission lifetimes, so one can guess whether the emitting state has the same spin as the final state of the emission process. In any event, the references are also cited in the tables, and although the reader doesn't know which reference, for a particular molecule, refers to which entry under solvent, temperature, absorption, emission, or lifetime, he is gratified to find that the alphabetically ordered bibliography includes the names of coauthors and the full titles of the papers. Apart from a few data concerning rare gas matrices, Meyer's tables are not an improvement over the Landolt-Börnstein compilations on the luminescence spectra of organic substances (*Numerical Data and Functional Relationships in Science and Technology*, new series, group 2, vol. 3, Springer-Verlag, 1967).

This book does not provide answers for those who want to know the extent to which low temperature spectroscopy has contributed or will contribute to our understanding of molecular structure. It does provide a needed single source of low temperature technical expertise, especially in regard to matrix isolation techniques. Perhaps the slant of the book, and one view of the state of the art, is best conveyed by noting that the number of waves per micrometer is tabulated to four significant figures for diatomics and to only three for polyatomics.

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Chemical Structure

Absolute Configuration of Metal Complexes. CLIFFORD J. HAWKINS. Wiley-Interscience, New York, 1971. xii, 350 pp., illus. $19.50. Interscience Monographs on Chemistry, Inorganic Chemistry Section.

The title notwithstanding, only about a third of this book deals directly with absolute configurations. Most of it is devoted to the related subject of