Strategies for Study of Synaptic Organization

Morphological, physiological, biochemical, pharmacological, and genetic approaches to analysis of synaptic structure and function were discussed at a symposium titled "Strategies for Study of Synaptic Organization: From Individual Synapse to Intact Organism." The meeting was held in Kyoto International Conference Hall, Kyoto, 2 to 5 September 1973, and was sponsored by the National Science Foundation and the Japan Society for the Promotion of Science under the joint United States—Japan Cooperative Program.

Y. Sano (Kyoto Prefectural University) described morphological studies of the mammalian neurosecretory system. K. Uchizono (University of Tokyo) reported on the dorsal horn of frog spinal cord that gave further support to the possibility that the shape and size of synaptic vesicles may be diagnostic in the identification of excitatory and inhibitory synapses. K. Hama (University of Tokyo) suggested from studies of the goldfish saccular macula that there are two possible systems of synaptic membrane recycling and that the relative rates of operation of the recycling pathways may vary with different rates of synaptic activities.

A. Takeuchi (Juntendo University) discussed critically the criteria for transmitter identification and concluded from a summary of his own studies that L-glutamate fulfills most of the requirements for excitatory transmitter at the crayfish neuromuscular junction. K. Ikeda (City of Hope National Medical Center) reported details of intracellular studies of neurons in the thoracic ganglion of *Drosophila melanogaster* that are responsible for abnormal leg-shaking specific for a single-gene mutant. This work in neurophysiological genetics appears to be a major advance in development of an approach to the understanding of mechanisms of genetic coding of nervous system function and behavior. From measurements of microphonic potentials in hair cells and intracellular potentials from auditory fibers in the goldfish sacculus, T. Furukawa and S. Matsuura (Osaka City University) concluded that adaptation of the excitatory postsynaptic potential is attributable to transmitter depletion and not to desensitization of the postsynaptic membrane. Further, their data suggested that transmitter-releasing sites within single sensory cells may be composed of multiple compartments having different thresholds for release. The identification and study by S. Berl (Columbia University) of actomyosin-like protein in synaptosomal fractions has led him to the formulation of a hypothesis that a contractile mechanism for exocytotic release of transmitter material may be operative at synaptic junctions. A Ca^{2+} regulatory mechanism appears to be a part of the system, which may be similar to the troponin-tropomyosin system of muscle. H. Yoshida and S. Ichida (Osaka University) reported experiments showing that there is an adenosine triphosphate–dependent binding of Ca^{2+} by synaptosomal membranes and that there is specific displacement of the Ca^{2+} by Na^{+}. According to evidence presented by T. Abe, T. Haga, and M. Kurokawa (University of Tokyo), rapid axoplasmic transport of phosphatidylcholine and proteins in frog sciatic nerve appears to occur together in the same structural entity, a membranous component. The roles of Ca^{2+} and microtubules in axoplasmic transport and the existence of cellulipetal as well as cellulifugal transport also were considered.

Considerable attention was focused on the neurochemistry of several putative transmitters. M. H. Aprison (Indiana University) summarized data from his laboratory, as well as from others, that furnish convincing evidence for believing that glycine is an inhibitory transmitter of a class of interneurons in the ventral gray matter of the cat spinal cord. M. Otsuka, Y. Miyata, S. Konishi, and T. Takahashi (Tokyo Medical and Dental University) presented evidence indicating that hypothalamic substance P may be an excitatory transmitter released from primary sensory neurons in spinal cord and that γ-aminobutyric acid (GABA)–releasing interneurons, which may produce presynaptic inhibition, are concentrated in the dorsal horn. E. Roberts (City of Hope National Medical Center) reported that L-glutamate decarboxylase, the enzyme that forms GABA, a putative inhibitory transmitter, can be made visible with peroxidase labeling techniques on sections of cerebellum, hippocampus, and spinal cord by use of rabbit antiserum to the purified enzyme. Clear visualization was achieved by light and electron microscopy of specifically stained nerve terminals in a manner consistent with a variety of indirect biochemical, physiological, and morphological data dealing with the synaptic role of GABA. Studies of the effects of various experimental procedures on the content of GABA in the lateral area of the hypothalamus and in the ventromedial nucleus reported by K. Kuriyama, H. Kimura, and M. Tachibana (Kyoto Prefectural University) suggested that GABA-releasing neurons may play an important role in the regulation of activity in feeding and satiety centers. N. Shimizu, T. Maeda, and M. Tohyama (Osaka University) described a series of experimental studies tracing the ascending connections of the noradrenergic neurons of the locus coeruleus into the cortex and of the dopamine neurons of the substantia nigra into the caudate-putamen. A. Ichiyama, S. Hori, and Y. Mashimo (University of Tokyo) concluded from comparative studies of the tryptophan 5-monooxygenases of brain and pineal gland that the enzymes in the two tissues possess different catalytic and molecular properties and that mechanisms for their regulation also may differ. A summary by T. W. Rall (Case Western Reserve University) of current data relating to possible roles of adenosine 3′,5′-monophosphate (cyclic AMP) in synaptic function with emphasis on new findings relating to specific stimulatory effects of adenosine on cyclic AMP formed the basis for a lively discussion.

M. Ito (University of Tokyo) elaborated a neural diagram for the vestibulo-cerebellar system from an analysis of the horizontal vestibulo-ocular reflex arc which was consistent with results obtained by observing eye movements induced by head rotation under various conditions of visual stimulation. By means of neurophysiological analysis, T. Shimono, S. Nosaka, and K. Sasaki (Kyoto University) traced the postnatal times at which different cell types in the rat cerebellar cortex became active and correlated these findings with histological observations. From recordings made from cells in the visual system under a variety of conditions, T. N. Wiesel and D. H. Hubel (Harvard University) established that the monkey may be susceptible to the effects of visual dep-

rivation even up to 3 years of age and concluded that "the presence of a certain plasticity of the nervous system early in life is presumably important for fine adjustments depending on experience." B. Agranoff (University of Michigan) summarized data showing that antibiotics that inhibit RNA and protein synthesis can inhibit the establishment of long-term memory of a variety of learned tasks in several species, but not of conditioned cardiac deceleration in fish, and that memory fixation apears to be initiated by environmental factors.

The meeting consisted of 21 presented papers and many active and even heated discussions by the participants and observers from both countries as well as from England and Canada.

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Forthcoming Events

October

13–17. **Corrosion Problems in Energy Conversion and Generation** Symp., Electrochemical Soc., New York, N.Y. (C. S. Tedmon, Jr., Room 3A48, Bldg. K-1, Research and Development Center, General Electric Co., P.O. Box 8, Schenectady, N.Y. 12301)

13–17. **Electrochemical** Soc., 146th annual, New York, N.Y. (V. H. Branneky, P.O. Box 2071, Princeton, N.J. 08540)

13–17. American Soc. for **Information Science**, Atlanta, Ga. (J. I. Smith, ASIS, 1155 16th St., NW, Washington, D.C. 20036)

13–18. Pacific **Dermatologic** Assoc., Las Vegas, Nev. (F. Beardsley, 180 Mark Twain Ave., Reno, Nev. 89502)

14–17. American **Chemical** Soc., 106th Rubber Div. mtg., Philadelphia, Pa. (H. W. Day, DuPont Co., 140 Federal St., Boston, Mass. 02110)

14–17. American Acad. of **Family Physicians**, Los Angeles, Calif. (R. Tusken, 1740 W. 92 St., Kansas City, Mo. 64114)

14–17. Association of American **Medical Colleges**, 85th annual, Chicago, Ill. (AAMC, Suite 200, 1 Dupont Circle, NW, Washington, D.C. 10036)

14–17. Association of **Official Analytical Chemists**, 88th annual, Washington, D.C. (L. G. Ensminger, AOAC, Box 540, Benjamin Franklin Sta., Washington, D.C. 20044)

14–18. American **Ornithologists' Union**, Norman, Okla. (G. E. Watson, Div. of Birds, Museum of Natural History, Smithsonian Inst., Washington, D.C. 20560)

14–18. Conference on the **Precipitation Scavenging of Atmospheric Aerosols and Gases**, U.S. Atomic Energy Commission, Champaign, Ill. (R. C. Semonin, Atmospheric Sciences Section, Illinois State Water Survey, Box 232, Urbana 61801)

14–19. Association of **Engineering Geologists**, Denver, Colo. (W. P. Rogers, AEG, Box 15124, Denver 80215)

14–19. **Psychology** Soc., Paris, France. (P. C. Haber, 100 Beekman St., New York 10038)

15. Oak Ridge **Associated Universities**, Oak Ridge, Tenn. (W. G. Pollard, ORAU, P.O. Box 117, Oak Ridge 37830)

15–17. Conference on the **Atmosphere of Venus**, Goddard Inst. for Space Studies, New York, N.Y. (J. E. Hansen, 2880 Broadway, New York 10025)

15–17. **Biological Safety** Conf., 17th, Research Triangle Park, N.C. (L. A. Taylor, Becton, Dickinson and Co. Research Center, P.O. Box 12016, Research Triangle Park 27709)

15–17. **Human Factors** Soc., Huntsville, Ala. (M. G. Knowles, HFS, P.O. Box 1369, Santa Monica, Calif. 90406)

15–18. American **Chemical** Soc., 10th western regional mtg., San Francisco, Calif. (P. C. Condit, Patent Dept., Chevron Research Co., 576 Standard Ave., Richmond, Calif. 94802)

15–18. Society for **Experimental Stress Analysis**, New Haven, Conn. (B. E. Rossi, SESA, 21 Bridge Sq., Westport, Conn. 06880)

15–18. **Optical** Soc. of America, Hous-