Neurobiology: Interdisciplinary Discussions of the Nervous System

The physiology, biochemistry, and behavioral output of the nervous system were the main topics of discussion at an international symposium held at the Barrow Neurological Institute, Phoenix, Arizona, 6–8 April 1964. Participants attended from the United States, Mexico, France, Sweden, Great Britain, and the U.S.S.R.

A. Hamberger (Göteborg) presented his work on the respiratory activity of isolated neurons and glia cells from the vestibular nucleus in rabbits. Vestibular stimulation caused marked changes in cell respiration and activity of succinoxidase. The need for careful controls in studies of this type was evidenced by the finding of contralateral changes in respiration and enzyme activity. The relationship between neurons and neuronal glia was very often reciprocal, while the capillary glia was altered under different conditions. The capillary glia may be concerned primarily with the transport of substances by the blood and brain. Neuronal glia may have a metabolic supporting role.

J. Mendelson (Cambridge, Massachusetts) discussed the effects of Mg^{++} on respiration of brain cortex slices and homogenates. He showed that, under carefully controlled conditions, elimination of Mg^{++} ions did not result in respiration changes. High concentrations of Mg^{++} depress respiration. Uptake of Mg_{28} was also studied and was found to be rapid, thus paralleling accumulation of Ca^{++}. It was independent of the rate of O_2 consumption.

The fashionable field of information storage in the brain was opened by a provocative theoretical discussion by J. Gaito (Kansas), in which he proposed DNA as the most capable "storage molecule." His arguments disfavoring RNA rested on the rapid rate of alteration, the multiple type of RNA, and possible artifacts in the changes of base pairs reported by Hydén.

The question of stability of DNA was raised by the studies of J. B. Best (Colorado) on the mechanisms involved in memory and morphogenesis in Planaria. Reminiscence and semi-lunar cycles were observed in this worm.

Electrical recordings from the cerebral cortex of fetal sheep were discussed by G. Kolmodin (Stockholm). Differences in the timing of appearance of several electrical phenomena (steady potentials, evoked responses, EEG, and others) were shown and were interpreted to be caused by different underlying biochemical processes. His data bearing on the generation of cortical steady potentials by processes utilizing anaerobic glycolysis were especially discussed.

E. Eidelberg (Phoenix) presented the results of computer analysis of amygdaloid "spindling" in cats. The spectral characteristics of this activity were related to a model which consists of a tuned resonant filter acting on random neural noise. The relationship of spindling to respiration and the effects of some hallucinogenic drugs were also noted.

An elegant method for the in vitro study of isolated retina from the rabbit has been developed by A. Ames, III (Cambridge, Massachusetts). He noted the great usefulness of this piece of mammalian central nervous system; it can be maintained in vitro, stimulated physiologically, and monitored electrically. Retina deprived of O_2 and glucose exhibited morphological alteration in mitochondria and depressed electroretinograms; these effects were reversed by addition of O_2 and glucose. Measurement of extracellular volume approached 25 percent; this percentage is in agreement with other chemical data, but in disagreement with electron microscopy. Movement of water and electrolytes in response to osmolality changes revealed similar rates of diffusion for Na^+ and Cl^- but a different rate of inulin.

N. N. Lyubimov (Moscow) described his experiments in dogs with surgical transections in the optic tract, corpus callosum, and midbrain tegmentum. He showed that a retinal-collicular-visual cortex pathway is present and functional, and that callosal connections (at least in the dog) between visual cortices subserve also a functional role in conveying information. He provided good evidence for a functional, perceptual role for the collicular afferent fibers, hitherto only related to pupillary reflexes.

The effects of changes in the ionic environment upon isolated muscle spindles of the frog were reported on by D. Ottoson (Stockholm). He found that the generator potential could be dissociated from the action potentials by total removal of N^+ from the fluid bath. In this condition the spontaneous spikes disappeared but the generator potential produced by stretch remained essentially intact. Increases of K^+ or decreases of Ca^{++} caused increased firing of the resting spindle and later this was followed by inactivity even during stretch.

Two closely related papers on the behavioral effects of caudate nucleus stimulation were given by P. Buser (Paris) and N. A. Buchwald (Los Angeles). Both authors analyzed the now well established depression of conditioned motor behavior by slow repetitive caudate stimulation. Buser proposed that this effect is observed only on learned (complex) motor tasks and not on relatively unconditioned behavior, such as seizing food and eating. Buser also compared the effects of caudate and midline thalamic stimulation and indicated some clear cut differences. Buchwald presented some new evidence that indicates that the effects of caudate stimulation on behavior are not due to capsular stimulation, as has been suggested recently by others.

The observation by John that the cortical EEG of animals in training shows increased slow-wave activity ("hypersynchronous") during intertrial periods was followed up by C. Guzman Flores (Mexico City) in split-brain preparations in which one hemisphere was trained via the ipsilateral eye. It was found that hypersynchrony occurred only on the "trained" hemisphere. Long training shows deficits in habit retention when stimulated eyes are switched in chiasma-sectioned cats. Evidently, stimulation of the specific sensory pathways is necessary for the maintenance of the stored visual information.

A. S. Schwartz (Phoenix) reported his studies, initiated together with D. B. Lindsley, on the relationship between photic driving of the EEG and thresholds of critical flicker frequency. The object was to determine which cerebral structures act as limiting factors in the discrimination of flicker. His preliminary evidence suggests the superior colliculus as subserving this role.

The effects of very low doses of irradiation on the central nervous system were described by J. Garcia (Long Beach, California). He and his associates have shown in the past that rats are capable of detecting doses smaller than 1 roentgen per second. Their current attempts to localize the receptors involved in the detection process suggest that olfactory, not visual, receptors may be involved.

B. A. Baldwin (London and Los Angeles) had developed a technique for controlling the cerebral circulation of the goat through externalized carotid loops. His methodology and controls suggest that this is an ideal preparatior

New AAAS Symposium Volumes

Spermatozoan Motility

Edited by David W. Bishop. 322 pages. 113 illustrations. References. Index. 28 tables. August 1962. $7.50 ($6.50 prepaid for AAAS members).

Great Lakes Basin

Edited by Howard J. Pincus. 320 pages. 92 illustrations. 46 tables. Abstracts. References. Index. August 1962. $7.50 ($6.50 prepaid for AAAS members).

Fundamentals of Keratinization

Edited by E. O. Butcher and R. F. Sognnaes. 202 pages. 136 illustrations. Summaries. References. Index. May 1962. $6.50 ($5.75 prepaid for AAAS members).

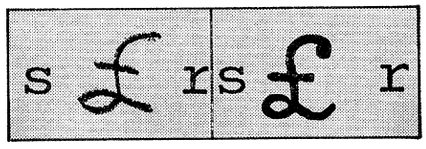
Biophysics of Physiological and Pharmacological Actions

Edited by Abraham M. Shanes. 612 pages. 212 illustrations, References. Index. December 1961. $13.50 ($11.75 prepaid for AAAS members).

Order today from

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

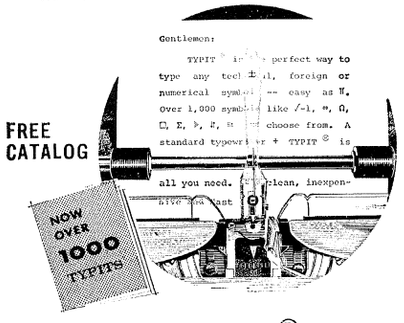
1515 Mass. Ave. NW, Washington, D.C. 20005



COMPARE!

Hand drawn symbols with TYPIT®.

Type any symbol perfectly in 4 seconds with TYPIT®. Fits standard typewriter without fuss or muss. Prints out as sharp as the letters on your typewriter. Write for FREE CATALOG.



TYPIT®

Type any Symbol -- PERFECTLY

3127 SU Colvin St., Alexandria, Va.

for a wide gamut of experimental problems. An interesting observation concerned the retention of a conditioned response despite repeated blocking of the cerebral circulation within 20 seconds after the conditioning trial.

Other speakers included C. Beyer (Mexico City), B. Grafstein (New York), P. Rudomin, J. Garcia Ramos (Mexico City), and S. P. Grossman (Iowa).

This symposium, the second in a series on neurobiology, is held alternately in Mexico and the United States. It was supported by a grant from the Office of Naval Research, U.S. Navy, and by local funds from the Neurological Sciences Foundation (Phoenix). Proceedings will be published soon as a special supplement of the *Boletin del Instituto de Estudios Médicos y Biológicos, México.*

E. EIDELBERG
A. S. SCHWARTZ, J. HARRIS
Barrow Neurological Institute of St. Joseph's Hospital, Phoenix, Arizona

Forthcoming Events

July

1–4. National Soc. of Professional **Engineers**, annual, Asheville, N.C. (K. E. Trombley, NSPE, 2029 K St., NW, Washington, D.C.)

1–4. British **Tuberculosis** Assoc., St. Andrews, Scotland. (BTA, 59 Portland Place, London, W.1, England)

2–3. **Spectrochemical Analysis**, limits of detection, conf., Exeter, England, Institute of Physics and the Physical Society, 47 Belgrave Sq., London, S.W.1, England)

2–4. Scandinavian, **Dental** Congr., Helsinki, Finland. (N. Anderson, Bergmansg. 11 D, Helsinki)

2–5. Northwest **Proctologic** Soc., Banff, Canada. (F. C. Swartzlander, Greyhound Bldg., Calgary, Canada)

2–8. **Nuclear Physics**, intern. congr., Paris, France. (The Congress, B.P. No. 14, Orsay, Seine-et-Oise, France)

5–10. American **Physical Therapy** Assoc., annual conf., Denver, Colo. (H. J. Hislop, 1790 Broadway, New York, N.Y.)

6–8. **Electron-Beam Processes** for Microelectronics, symp., Malvern, Worcester, England. (Information Officer, Royal Radar Establishment, St. Andrews Rd., Malvern)

6–9. **Learning and Associated Phenomena in Invertebrates**, Cambridge, England. (D. Davenport, Dept. of Biological Sciences, Univ. of California, Santa Barbara)

6–9. **Signal Processing** in Radar and Sonar Directional Systems, Birmingham, England. (British Institution of Radio Engineers, 9 Bedford Sq., London, W.C.1)

6–10. **Magnetic Recording**, intern conf., London, England. (Secretariat, the Conference, c/o Inst. of Electrical Engineers, Savoy Pl., London, W.C.2)

6–10. Theoretical and Applied **Mathematical Programming**, intern. symp., London, England. (M. Kinnaird, Operational Research Soc., 64 Cannon St., London, E.C.4)

6–10. Physics of **Non-crystalline Solids**, intern congr. Delft, Netherlands, (J. A. Prins, Lab. Technische Natuurkunde T.H. Delft)

6–11. **Magnetohydrodynamic Electrical Power** Production, Paris France. (European Nuclear Energy Agency, 38 Blvd. Suchet, Paris 16e)

6–12. **Sanitary Engineering**, 9th inter-American congr., Bogotá, Colombia. (J. A. Jove, Inter-American Assoc. of Sanitary Engineering, Centro Simón Bolívar, Edificio Sur, 6° piso, Caracas, Venezuela)

7–10. **American Dental Soc. of Europe**, annual, Brighton, England. (A. E. F. Sturridge, 35 Harley St., London, W.1, England)

7–11. European **Orthodontic** Soc., 40th congr., Athens, Greece. (H. N. Haralabakis, Akadimias St. 31, Athens 135)

8–10. **Sulfur Allotropes**, Univ. of California, Berkeley. (B. Meyer, Latimer Hall, Univ. of California, Berkeley)

8–11. International Soc. of **Gastroenterology**, 6th intern. congr., Medellin, Colombia. (J. L. A. Roth, 419 S. 19 St., Philadelphia, Pa.)

8–16. **Entomology**, 12th intern. congr., London, England. (P. Freeman, British Museum of Natural History, Cromwell Rd., London, S.W.7)

10–11. Rocky Mountain **Cancer** Conf., Denver, Colo. (N. P. Isbell, 1809 E. 18 Ave., Denver 80218)

10–15. **Pleistocene Geomorphology**, symp., Exeter, England. (T. H. Elkins, Royal Geographical Soc., Kensington Gore, London, S.W.7)

12–15. **Solid Propulsion**, NASA meeting, Philadelphia, Pa. (W. H. Hunter, Office of Program Development, Washington, D.C. 10025)

12–16. **Gastroenterology**, 9th Pan American congr., Bogotá, Colombia. (C. A. Estape, Soriano 877, Montevideo, Uruguay)

13–15. Problems of **Capillary Permeability** in Health and Disease, Univ. of Michigan 1964 summer symp., Ann Arbor, Mich. (M. M. Dewey, Dept. of Anatomy, Univ. of Michigan, Ann Arbor)

13–15. **Data Processing and Acquisition in Biology and Medicine**, conf., Rochester, N.Y. (K. Enslein, 42 East Ave., Rochester 14604)

13–17. **Canadian Teachers'** Federation, Lac Beauport, P.Q., Canada. (G. Nason, 444 MacLaren St., Ottawa, Ont., Canada)

13–17. Chemistry of **Carbohydrates**, intern. symp., Münster, Germany. (F. Micheel, Organisch-Chemisches Institut, Universität, Hindenburgplatz 55, Münster)

13–17. International Assoc. for **Child Psychiatry** and Allied Professions, London, England. (F. H. Stone, Royal Hospital for Sick Children, 70 University Ave., Glasgow, W.2 Scotland)

13–18. **Instrumental Analytical Chemistry**, 3rd annual symp., Bethlehem, Pa. (A. J. Diefenderfer, Dept. of Chemistry, Lehigh Univ., Bethlehem)

13–18. Latin Federation of **Medical Electro-Radiological Socs.**, 6th congr., Brussels, Belgium. (Secretariat, 256 Chaus-