News of Science

Sleep and Cerebral Oxygen Consumption

Numerous hypotheses have been elaborated in attempts to explain the puzzling phenomenon of sleep. At one time or another sleep has been attributed to arterial anoxemia, cerebral ischemia or anoxia, or to a generalized narcosis based on an unidentified humoral agent. New light has been shed on this old problem in a report by Mangold, Sokoloff, Conner, Kleinerman, Therman, and Kety in the July issue of the *Journal of Clinical Investigation.*

In a group of normal volunteers, measurements were made of cerebral blood flow and oxygen consumption, along with electroencephalographic and other physiological observations, during sleep and while the subjects were awake. During sleep there was a small but significant increase in cerebral blood flow, but there was no significant change in cerebral oxygen consumption or in arterial oxygen, carbon dioxide, or hemoglobin concentration. In coma or anesthesia, however, a significant reduction in cerebral oxygen consumption, sometimes to as low a value as 50 percent of normal, was demonstrated. The authors conclude that

"The state of sleep should be added to a growing list of conditions, like schizophrenia and performance of mental arithmetic, in which a good correlation between energy conversion and functional activity commonly found in other organ systems appears to be absent. This result is compatible with the current vogue of viewing the brain as a calculating or communicating mechanism which, in contradistinction to machines which do mechanical work, utilizes by far the greater part of its energy requirements merely in keeping its circuits alive and sensitive; the presence of a message, its functional usefulness or rationality adds only infinitesimally to the total load. Equally adequate, however, are hypotheses founded more on traditional biological concepts than on electronic analogues.

"Thus, when the brain is considered as a great number of functional units, many of which may be reciprocally related with regard to activity, then increased activity in one group of units may result in decreased activity in others. Under such conditions, different functions could result in an altered pattern of distribution of the activity without measurable changes in the net over-all oxygen consumption of the brain. Or, even more simply, is it not conceivable that the primitive functions of the brain, namely, the regulation of unconscious vegetative functions in the body, consume so much of the total cerebral oxygen requirements that they obscure the metabolic effects of the later phylogenetic functions found in conscious waking behavior, such as thought and reason?

"These studies have not elicited, nor were they designed to elicit, information bearing on the more subtle functional, biochemical, or electrical alterations in sleep. They do, however, render untenable those hypotheses which attribute this important phenomenon to an anoxemia, to cerebral ischemia, to narcosis, or to a generalized depression in cerebral metabolism."

Rubber Commission

The National Science Foundation has announced the appointment of a Special Commission on Rubber Research that will propose recommendations concerning the role of the Federal Government in basic research on synthetic rubber. The members of the commission are Arthur C. Cope, head, department of chemistry, Massachusetts Institute of Technology; Joseph C. Elgin, dean, school of engineering, Princeton University; Paul D. Foote, Gulf Research and Development Co., Pittsburgh, Pa.; Edwin R. Gilliland, professor of chemical engineering, Massachusetts Institute of Technology; Warren C. Johnson, associate dean, division of physical sciences, University of Chicago; William H. Davis, Davis, Hoxie and Faithfull, New York; Frank A. Howard, retired president, Standard Oil Development Co. of New Jersey; Farrington Daniels, chairman, department of chemistry, University of Wisconsin; David D. Henry, executive vice chancellor, New York University; Lawrence A. Kimpton, chancellor, University of Chicago; and William A. W. Krebs, Jr., associate professor of law, School of Industrial Management, Massachusetts Institute of Technology. Six members of the commission are scientists and five are nonscientists, in accordance with the provisions of the National Science Foundation Act, which also specifies that the commission shall elect its own chairman and vice chairman.

The synthetic-rubber research program, including the operation of a pilot plant and testing laboratory at Akron, was developed as an integral part of the synthetic rubber industry, which was administered by the Reconstruction Finance Corp. and by the Federal Facilities Corp. for the Government from the early days of World War II until recently.

On 1 July official responsibility for Federal support of synthetic rubber research passed to the National Science Foundation as a result of recommendations of the Rubber Producing Facilities Disposal Commission that was established by the 83rd Congress. The disposal commission also recommended that the Government's synthetic rubber plants be sold to private companies, and all but two of these were sold by 2 May.

The disposal commission recommended continuance, for at least a trial period running through June 1956, of the Government's synthetic-rubber research program conducted through universities and other institutions and the Government laboratories operated under contract by the University of Akron. The National Science Foundation is charged with the supervision and control of the research program and has been asked to evaluate the long-range role and responsibility of the Federal Government in this field.

The new special commission will also consider various alternatives regarding the Government laboratories at Akron, including the possible sale or lease to private industry, or to a university or other nonprofit institution, or retention by some agency of the Federal Government. The laboratories represent an original Federal investment of $2.2 million.

It is hoped that the special commission will complete its study of the entire problem and present its recommendations on or before 31 Dec., in order that its findings can be reflected in proposed legislation submitted to the second session of the 84th Congress.

Science and Politics

Scientists have an obligation to supply politicians with facts, thus reducing "the area of uncertainty and dispute to a minimum," according to Paul B. Sears, professor of conservation at Yale University. In a speech delivered on 18 Aug. at the first New England Watershed Conference, Sears, who is president-elect of the AAAS, said that this fact-gathering function gives science "a very definite relation to politics in the world today." He stated:

"I happen to have a high regard for

the art of politics and most of the men and women who practice it, for they are usually as good as we let them be. It is their duty to hammer out and execute policy. This difficult task ought not be made worse by obliging them to work in the dark. . . ."

Warning that "the certain road to defeat is to waste time in needless conflict among ourselves," Sears urged his fellow-conservationists "to get the cards on the table so that each of us knows the problems of the other fellow." He maintained that "it is surely unjust to brand a man a criminal for polluting a stream while forgetting that the public, always anxious for new industries, has been inviting this practice for a century or more. And because an enterprise wishes to expand, it is wrong to assume offhand that its owners do not care whether they ruin an area or not."

He pointed out that "the industrialist, unless he is an utter fool, knows the value of attractive living conditions for his employees." Sears also commented that there are "tremendous possibilities" for good will and collaboration in each community "once the facts are clear."

Thermal Cross Sections of Fissionable Isotopes

Recently declassified information was presented on the cross sections of the fissionable isotopes uranium-233, uranium-235, and plutonium-239 at the technical session, "Cross sections of fissionable elements," of the International Conference on the Peaceful Uses of Atomic Energy. Excellent agreement was obtained among participants from France, the United States, the United Kingdom, and the Soviet Union on values for these isotopes in the low-energy region. At the suggestion of the chairman, D. J. Hughes of Brookhaven National Laboratory, participants from the four countries met after the formal session to consider the thermal absorption and fission cross sections of these isotopes. It was decided to prepare a set of world average values for these cross sections, which could be used as a means for coordinating reactor calculations based on these cross sections. The average values are shown in Table 1. The quoted errors of the world average values given are based primarily on the spread in reported results and are sometimes larger than the errors of specific quoted results.

Table 1. International values for thermal cross sections of fissionable isotopes

Isotope	σ_{abs} (barns)	σ_F (barns)
Uranium-233	593 ± 8	524 ± 8
Uranium-235	698 ± 10	590 ± 15
Plutonium-239	1032 ± 15	729 ± 15

News Briefs

■ Ownership of outer space in connection with the proposed earth satellites has been brought up by John Cobb Cooper, authority on international air law. Cooper said recently in Montreal that agreement on how far the rights of all countries extend above the earth's surface should be reached before vehicles are sent 250 miles into outer space.

■ Discovery of a true radio star is described in the 13 Aug. issue of *Nature* by John D. Kraus, H. C. Ko, and D. V. Stoutenburg of Ohio State University.

This radio star, which is of stellar size, is located at the north boundary of the constellation Hydra, at a right ascension of 8 hours 19 minutes, and a declination of 7 degrees north. So far the astronomers have not been able to identify the radio star with any visible star, although there are several faint stars near the radio position.

■ The synthesis for the first time of cytisine, an extremely poisonous alkaloid, has been announced by E. E. Van Tamelen and John Baran of the University of Wisconsin chemistry department. Cytisine is so poisonous that it is of little practical value, but its synthesis will aid work on related substances that are useful to man.

Cytisine is one of the lupinanes. There exists in most lupinane molecules a unique, unsymmetrical, bridged structural system that various chemists have been attempting to reproduce for some years. Other alkaloids have been synthesized before, but never one of this type. In their synthesis, the investigators began with a simple coal-tar product, alpha-picoline; they built cytisine in 11 steps.

Cytisine is found naturally in certain leguminous plants, gorse, broom, and laburnum. Ancient peoples knew that these plants are extremely poisonous, and this quality very early aroused the curiosity of chemists, who isolated cytisine as early as 1865.

In the early 1930's two research groups, one led by H. R. Ing in England, the other by Ernst Spath in Austria, simultaneously worked out the chemical structure of cytisine, showing that it is one of the complex lupinanes. Van Tamelen and Baran began their work less than 2 years ago.

■ The American Institute of Physics, 57 E. 55 St., New York, will shortly commence publication of *Soviet Physics—JETP*, a periodical translation of research reports appearing in the Russian-language *Journal of Experimental and Theoretical Physics*. The National Science Foundation has granted funds to help finance the first year's operations. The editor will be Robert T. Beyer of the department of physics, Brown University, where the editorial office will be located.

The American Institute of Physics is the publisher of many of the American physics journals, for the institute is the cooperative agency of the American Physical Society, the Optical Society of America, the Acoustical Society of America, the American Association of Physics Teachers, and the Society of Rheology. The new journal will appear every 2 months, the first issue being scheduled for publication in October.

Beyer will be responsible for the assignment of each original article to a translator-physicist. Beyer himself reads Russian and is actively interested in the fields of acoustics, ultrasonics, and low-temperature physics. A survey that has been made indicates that enough Russian-reading physicists are available in the United States to translate all the contents of the Soviet journal.

An Advisory Board on Russian Translations has been appointed by the American Institute of Physics. The chairman is Elmer Hutchisson of Case Institute of Technology, who is also vice president of the abstracting board of the International Council of Scientific Unions, and other board members are Dwight E. Gray, chief of the Technical Information Division of the Library of Congress; Morton Hamermesh of Argonne National Laboratory; Vladimir Rojansky of Union College; and Victor F. Weisskopf of Massachusetts Institute of Technology.

Scientists in the News

CHARLES W. SHILLING, former captain in the Medical Corps of the U.S. Navy, has been appointed special assistant to John C. Bugher, director of the Atomic Energy Commission's Division of Biology and Medicine. Shilling recently retired from the Navy after 28 years of service. He holds a B.S. degree from Taylor University, Upland, Ind., and a B.A. degree from the University of Michigan; he received an M.D. degree from the University of Michigan Medical School in 1927. He attended the Harvard School of Public Health in 1932–33, and in 1954 was awarded an honorary doctor of science degree from Taylor University.

After internship in the U.S. Naval Hospital, Chelsea, Mass., in 1927–28, Shilling was assigned to submarine training duty and to various submarine bases. He conducted research and development work in safety, salvage, and escape equipment for submarines as well as experimental work in physiology and biochemistry related to air and oxygen under high pressure. He became a qualified deep-sea diver and served aboard the U.S.S. *Cam-*