SCIENCE NEWS

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ADVENTURES IN SCIENCE[1]

Announcer: "Adventures in Science" . . . with Watson Davis, director of Science Service. What's new in science to-day, Mr. Davis?

Mr. Davis: The National Academy of Sciences is meeting here in Providence, R. I., to-day, and I want to tell about some of the important scientific discoveries that were announced before it this morning and afternoon.

Announcer: What were some of them, Mr. Davis?

Mr. Davis: I was very much interested in the paper by Dr. Hudson Hoagland, Clark University physiologist, who has found that breathing of your brain cells sets the pace for your mental activity.

New understanding of paresis, or brain syphilis, one of mankind's major mental diseases, may result from this discovery.

Electric waves from the brain itself signal to scientists the nature of this chemical control.

Each cell in your brain, as a by-product of respiration, builds up electric potential. The cell walls have electric resistance. The electricity is discharged whenever the respiration process builds up potential and loads the capacities of the cell walls to their critical firing point. This electrical discharge forms the brain waves—electrical signals direct from the brain. Thus brain cell respiration creates the brain waves.

Thanks to brain waves, too, science's inquiring finger can now point more accurately to the parts of the cortex of the brain that discriminate sensation, or feeling, in various parts of the body. This is an achievement reported by Dr. J. G. Dusser de Barenne, of Yale University.

The electrical brain waves, generated in the brain itself, can be made to signal the location and the extent of the area of the sensory cortex.

The shape of man's body hints how he may die. The shape and proportions of a man, still in good health and a long way from his funeral, give fairly definite indication of how and when he may be expected to die. This is a find by Professor Raymond Pearl and Dr. W. Edwin Moffett, of the Johns Hopkins University.

Professor Pearl made a study of the histories of 2,332 men, all dead, representing the longest-lived and shortest-lived groups out of a much larger number. Information about their bodily constitution had been placed on file years before, when they were all in good health, with no indications of onset of the various diseases that finally killed them. He divided them into two classifications, long-lived and short-lived.

He found short-lived men who died of heart and kidney ailments were bigger around the body, in both chest and abdominal girth, than long-lived men who died of the same groups of diseases.

This condition was reversed in the case of men who later died of cancer and pneumonia: the skinny men were shorter lived than the stouter type.

[1] Radio program presented on Monday, October 23, under the auspices of Science Service, over the Columbia Broadcasting System.

In those eventually dying from cancer and from diabetes the average body weight was also greater in the short-lived than in the long-lived group. The difference here, however, was too small to justify any very definite conclusions.

Height apparently had nothing to do with length of life. Talls and shorts were scattered at random through all the disease groups, among both long-lived and short-lived.

Pulse rate was more rapid among all groups of the short-lived than it was among the long-lived groups.

Production of atomic projectiles of more than 100,000,000 electron-volts energy was forecast when Professor E. O. Lawrence, of the University of California, inventor of the atom-smashing cyclotron, told the academicians that building of a 120-inch, 2,000-ton cyclotron, double the size of his world's largest, is entirely feasible.

His new 60-inch cyclotron, weighing over 220 tons, has just gone into service. Gratifying results cause Professor Lawrence to look forward to a still more powerful machine for impressing large energies upon tiny fragments of matter.

By bombarding bismuth and lead with 32,000,000-volt helium ions, Professor Lawrence has obtained large yields of new radioactive substances that produce alpha particles, which are also emitted from natural radium.

These, or other cyclotron radiations, promise to prove useful in treatment of cancer and for other medical purposes.

The National Academy of Sciences is the leading scientific body of the nation before which are read and discussed scientific reports, as is being done here at Brown University this week. But that is only one of its functions. It is Uncle Sam's scientific consultant as well. As a body it is adviser to the United States Government on things scientific. Quietly, without much fanfare of publicity, the academicians give freely of their expert knowledge and opinion when the need arises. As senior scientific body of the nation the academy also cooperates closely with hundreds of other scientific groups in solving problems and conducting research of immense importance to all of us. Our Adventures in Science guest to-day is the president of the National Academy of Sciences, Dr. Frank B. Jewett. He is one of our leading engineers, president of that fruitful cradle of new industries, the Bell Telephone Laboratories. Dr. Jewett will tell us how science could be mobilized, and, indeed, is being mobilized, in the United States.

In time of war, Dr. Jewett, the mobilization of science would be as necessary as the mobilization of the Army and Navy.

Dr. Jewett: Yes, it is. War always brings emergency problems for the scientists of a nation. But we ought not to let this overshadow the fact that in a country like the United States science is always mobilized to a considerable extent. Our government always has problems—for example, those of public health, which deserve continuous study and which in wartime may be accentuated. Likewise, the Army and Navy have innumerable problems of so broad a character that they extend beyond the scope of the organized forces and their specialized laboratories, and in the solution of which they ask the assistance of the nation's outstanding specialists. In the handling of such long-range problems it is apparent that we must take time by the forelock; adequate preparedness presupposes more or less continuous focusing of the nation's best scientific talent upon these problems of defense. Such problems arise not only in the newer developments, such as flying, but are equally numerous in the older services.

Mr. Davis: As I understand it, Dr. Jewett, the National Academy of Sciences, which serves the government in peace time, would have responsibilities placed upon it in time of war.

Dr. Jewett: That is correct, Mr. Davis. The National Academy of Sciences had its inception during the Civil War. It was created by an Act of Congress at the suggestion of Abraham Lincoln. Notable extensions have taken place in the meantime. The body which President Lincoln's administration created was called, and to-day is called, the National Academy of Sciences. I should like to read a portion of Section 3 of the Act of Incorporation:

"... the Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art, the actual expense of such investigations, examinations, experiments and reports to be paid from appropriations which may be made for the purpose, but the Academy shall receive no compensation whatever for any services to the Government of the United States."

Mr. Davis: And subsequently, Dr. Jewett, this National Academy of Sciences has been augmented by other organizations?

Dr. Jewett: Yes, and by one in particular. In 1916 President Wilson asked the academy to organize a subsidiary body of broader membership as a measure of national preparedness. This body, called the National Research Council, accomplished such important results in organizing research and in securing cooperation of military and civilian agencies before and during American participation in the last war, that on May 11, 1918, President Wilson issued an executive order establishing the National Research Council as a permanent body. Perhaps the best way to illustrate the functions of the council, and at the same time minimize words, is to list its divisions. They are nine in number, as follows: Foreign Relations, Educational Relations, Physical Sciences, Engineering and Industrial Research, Chemistry and Chemical Technology, Geology and Geography, Medical Sciences, Biology and Agriculture and, finally, a division for Anthropology and Psychology.

Mr. Davis: Won't you explain briefly, Dr. Jewett, how the proper personnel is selected from among the scientists of the country?

Dr. Jewett: In the first place, I ought to state that the 300 men and women who constitute the membership of the National Academy are elected on the basis of outstanding eminence in their field of science. The academy is divided into sections corresponding to the various sciences. Thus, there is a section for chemistry, another for mathematics, one for engineering, etc. Each section, of course, has a chairman who is, himself, preeminent in that field. Further, it is safe to say that the circle of acquaintanceship of the members of any section extends outward to include practically every person in the country who can qualify as well informed in the subject-matter of the section.

The National Research Council is likewise divided along lines of the various sciences. It has its permanent committees or divisions with chairmen who are selected for knowledge, experience and business ability. These chairmen, on the one hand, are naturally well acquainted with the officers of the government departments whence the problems and questions arise—and, on the other, are well acquainted with the nation's outstanding experts, whether connected with universities or with private industry. Thus, it will be seen that the National Research Council is a sort of business organization which derives its guidance from the academy and has behind it the prestige of the nation's leading scientists. Through its numerous working committees, the National Research Council is made up of many hundred scientists and engineers.

Mr. Davis: I think it might help us, Dr. Jewett, if you could say a few words about some of the problems which the academy and its council have studied or are studying for the government. Of course, I realize that many of these problems may be confidential, but doubtless there are others which are not secret.

Dr. Jewett: Well, one problem which comes to my mind is that of highway research. The council has cooperated over a period of years with the United States Bureau of Public Roads and has done effective work in coordinating information and in encouraging investigations upon the planning, building and operation of highways. During the past year, at the special request of the Bureau of Public Roads, the council has devoted particular attention to the problem of highway safety. These studies have been carried on in cooperation with the highway organizations in a number of states and comprise such topics as: Non-uniformity of state motor-vehicle traffic laws; skilled investigation at the scene of the accident needed to develop causes; inadequacy of state motor-vehicle accident reporting; official inspection of vehicles; case histories of fatal highway accidents; the accident-prone driver.

Another program of a long-time nature, and one which very definitely relates to public welfare, although not particularly to military activity, is research upon narcotics. In the first place, much has been added through this work to our knowledge of the chemistry and pharmacology of narcotic substances. From over three hundred new alkaloid substances produced experimentally, several have been found which promise medical uses. Much of the clinical work has been done at the United States Public Health Service Hospital in Lexington, Kentucky. Another important phase of narcotics research has been the development of means for the control of these new drugs.

These are but single instances. Since the academy's organization over one hundred major problems, covering practically all fields of science, in addition to a host of lesser ones, have been submitted to the academy by the Federal Government. One of the earliest, and presumably it arose as a result of the building of the iron gunboat *Monitor* during the Civil War, was to study the magnetic compass with a view to compensating for the magnetic effect of ships built wholly or partly of iron. The findings arrived at by the academy are, I believe, standard even to this day.

Mr. Davis: Such problems are certainly of fundamental importance to the nation, Dr. Jewett. What are some of the current problems before the Academy and the Research Council?

Dr. Jewett: The most recent government request has to do with what kind of blind landing system should be adopted for American airplanes. Numerous systems have been demonstrated and the government has asked the academy to examine the evidence and advise as to a system which can be installed at all airports and on all airplanes.

Two other projects involve aviation. We are cooperating in aircraft production planes, both current and with a view to future developments. Also our psychologists are advising the Civil Aeronautics Authority on tests that can be used in connection with the training of thousands of college boys and girls to be airplane pilots. Not long ago the academy conducted for the government an extensive inquiry into lighter-than-air aircraft.

Mr. Davis: Many of the projects do not have a direct military bearing.

Dr. Jewett: That is true. For instance, the National Research Council is sponsoring research in aerobiology and scientists are flying aloft sampling the spores, bacteria, insects and other living things that the winds carry from place to place. Our program in endocrinology has achieved significant results that will not only add to knowledge but eventually save human lives. A conference called by the council this summer at the request of the government lent scientific aid to the United States Antarctic Expedition about to set forth. The Chemistry Division is just now surveying chemical research facilities in leading universities, and the council as a whole has undertaken to make a complete survey of the nation's industrial research facilities—both human and material.

Mr. Davis: How are these investigations paid for, Dr. Jewett?

Dr. Jewett: In part, expenses of investigations are paid by the department of the government posing the problem, but in part there are large expenses which we may call "going" expenses connected with organizations like the academy and the council—expenses which in private business would be analogous to "loading"—and these can not be billed to the government. To defray these and also to make possible many subsidiary lines of research, the academy has been very fortunate in attracting donations and gifts, the income from which amounts to about $200,000 per year. Private sources supply in large part, therefore, the funds which the academy and the council require, just as private sources form the chief support of the fundamental research programs of our universities.

Mr. Davis: It seems to me one of the most important contributions that has been made to American science is the training of leaders in research that has resulted from the National Research Council fellowships administered over a period of years.

Dr. Jewett: Yes, twelve hundred young scientists have been able to continue research training beyond the usual Ph.D. degree, and these splendidly equipped scientists are in many cases forging to the forefront of American science. I think, Mr. Davis, that the question of scientific mobilization for problems of national importance, whether of peace or war, can be summed up by saying that in the National Academy of Sciences and National Research Council the United States has an active operating agency which covers every field of fundamental and applied science. Further, that it is an agency which can bring to bear on any problem the best talent which the nation possesses.

Mr. Davis: Thank you, Dr. Jewett, for this insight into how science can be mobilized to aid our government and nation in times of peace and war.

ITEMS

SULFAPYRIDINE, the chemical remedy that has been saving lives threatened by pneumonia, has been given to seven patients with tuberculosis in the hope that it would be equally useful as a remedy for this ailment. This hope was aroused by reports of previous use of the chemical for treating guinea pigs with tuberculosis. Unfortunately, the remedy failed to help any of the human patients, Drs. Stanton T. Allison and Robert Myers, of New York, report to the *Journal* of the American Medical Association. Both sulfapyridine and its chemical relative, sulfanilamide, are proving useful in treating another condition, the usually fatal blood poisoning due to staphylococcus infection. Cases in which these drugs are believed to have helped patients recover are reported in the same issue of the *Journal* by Drs. William A. Thornhill, Jr., Howard A. Swart and Clifton Reel, of Charleston, W. Va., and Samuel L. Goldberg and Allan Sachs, of Chicago.

A NEW rival for the carbon-arc searchlights has appeared in a 25,000,000 candlepower searchlight, using three tiny water-cooled mercury arcs, which has been developed by the General Electric Company. While present-day searchlights need an attendant to adjust the carbons for best illumination, the new searchlight does not wear out, needs no adjustment and is designed for lights in inaccessible places. Ninety gallons of water an hour are pumped through the cooling containers of the mercury arcs and then passed to an automobile-type radiator where the fluid is cooled for recirculation. Though more convenient, the new searchlight is still below the present high-intensity searchlights in beam candlepower and effectiveness.

DELIBERATELY knocking out front teeth was a youthful fashion in Indian days, it appears from an investigation of Dr. Aleš Hrdlička, of the Smithsonian Institution. He recently returned from anthropological study in the Soviet Union, where he found for the first time evidence indicating that America's Indians and Siberia's New Stone Age natives both widely practised the ceremony of knocking out front teeth of young boys and maidens. The custom provides a new bond showing origin of the American Indian in Asia. In adult skulls from both countries, Dr. Hrdlička explained, there may be back teeth missing from abscesses or other conditions, but in many skulls there are front teeth which show signs of having been extracted long ago, with indications that it was done in youth. The condition is prevalent even now among Australian and African natives and with them it is done generally as a sacrifice or a test of endurance.