x-ray physics as a whole. Absorption, refraction, scattering, the Compton effect and other branches of x-ray physics present the same variety of researches, ranging from extreme refinements in the study of familiar phenomena to preliminary explorations of new ones.

The most unexplored field in all x-ray physics, however, lies in the direction of extremely high voltages. Coolidge, Lauritsen, Tuve, Lawrence, van der Graaf and their collaborators have already shown the way to this new field and found plenty of new rays there. Thus far, the new rays are all of one type, continuous spectra. But with what we now know of nuclear excitations and disintegrations by positive rays and of nuclear excitations at least by beta rays, there is no telling what may be found in this new field.

Altogether, x-ray physics includes not only the old field of wave-length research, now pushing on from its fifth significant figure to its sixth and seventh, and such newer fields as intensities, now trying for the second or third figure, but even such a very new field as this one of high voltages, where the first figure is still unknown.

# SCIENTIFIC EVENTS

## THE BRITISH DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

ACCORDING to the annual report of the British Department of Scientific and Industrial Research, issued recently, the grant of £1,000,000 made by the government in 1917 for the encouragement of industrial research has become exhausted. The fund has been used by the department for assisting the formation of cooperative research associations in various industries, maintained partly by grants from the department and partly by subscriptions from industry. Though the "million fund" is no longer available the department's grants are now being made from its parliamentary vote.

A large part of the report of the Advisory Council of the department, signed by Lord Rutherford, is devoted to a survey of the research association scheme and to summarizing the results of the experiment. The expending of the million fund has attracted a total industrial contribution of £1,750,000, and at the moment the state is contributing £65,000 a year and industry £170,000 a year towards the support of a group of nineteen research associations, which include in their membership some 5,000 firms.

Striking examples are quoted to illustrate the enormous savings that have accrued from research work in various large industries. The report points out that the annual sum of less than £250,000 is trivial in relation to the interests involved and the possibilities awaiting realization. The basis on which many of the research associations are working is said to be hardly commensurate with the size of the industries they serve.

Work in progress is carried on in the department's own establishments and in the laboratories of research associations. For example, work in progress at the Department's Building Research Station includes the study of the most economical means of warming a house, investigations on wall plasters, on the problem of damp walls, on painting on cement and plaster, and on the deterioration of bricks.

The work of the Food Investigation Board of the Department is said to be meeting with considerable success in improving the quality of foodstuffs and in eliminating waste by better methods of transport and storage.

The Wool Industries Research Association has found a new process for making wool unshrinkable by the treatment of the wool fibers in bulk before they are spun.

Work for the automobile industry included research on the problem of cylinder and piston wear, which involved 360 distinct engine tests and 15,000 measurements. Besides this work, the Research Committee of the Institution of Automobile Engineers is carrying out investigations on the wear of valves and valve-seats, big-end bearing problems, lubricating oil pumping, and oil consumption. During the year the responsibility for road research has been transferred to the department from the Ministry of Transport. Researches on road tars are being carried out at the Chemical Research Laboratory. Work on motor-car headlights at the National Physical Laboratory has led to a method for determining the light distribution which should be aimed at for a headlight beam.

The report states that many of the researches of the department have a direct bearing on public health. Chief among these is the work of the Water Pollution Research Board on water supplies and the prevention of pollution. A complete survey is being made of existing knowledge regarding the solvent action of water on lead. The effect of electric currents in leaden waterpipes on the lead content of the water is also being investigated. Work is also being done on water-softening processes.

At the request of the Home Office, the department has arranged for an investigation to produce more efficient respirators for use in industrial processes as a protection against the inhalation of dust.

Research is also being carried out on the detection of small quantities of toxic gases in the atmosphere, and on respirators to prevent the breathing of such gases.

The improvement of materials used in dentistry is also a subject of research under the department, while x-ray examinations have been carried out in cooperation with the Medical Research Council on the structure of teeth.

## THE JOHN B. PIERCE LABORATORY OF HYGIENE AT NEW HAVEN, CONN.

UNIQUE facilities for the study of the effect of a wide variety of atmospheric conditions on the health and comfort of human beings and animals have been provided through the completion of the John B. Pierce Laboratory of Hygiene at New Haven, Conn., according to an announcement made by Professor C.-E. A. Winslow, of the Yale University School of Medicine, before the recent meeting of the American Society of Heating and Ventilating Engineers.

Although the laboratory is an independent institution, it is conducted in affiliation with the Yale University School of Medicine, with Professor Winslow as director, and its advisory staff is comprised of experts in medicine, physiology, psychology, engineering and physics.

Two years have been spent by the John B. Pierce Foundation in designing and constructing the Laboratory of Hygiene. The object of the foundation, by the terms of the will of the late John B. Pierce, is "the promotion of research, educational, technical or scientific work in the general field of heating, ventilation and sanitation . . . to the end that the general hygiene and comfort of human beings and their habitations may be advanced." Hitherto, facilities for thorough-going research in this field have been lacking.

The central feature of the laboratory is a two-room frame house completely surrounded, above and below and on all four sides, by "shell" spaces. In these six spaces any desired conditions of temperature and humidity can be produced, against which the two experimental rooms can be heated and ventilated by various methods. The test rooms are 15 feet by 12 feet by 9 feet high. Each room has three windows opening on the shell spaces. The rooms are electrically lighted and comfortably furnished with rugs, hangings and household furniture, so that subjects can live in them comfortably for extended periods. There is a control room on the same floor as the test rooms. The first floor of the building, which is on Congress Avenue, opposite the Yale University School of Medicine, contains the entrance lobby and offices and a workshop with lathes and benches for making the necessary equipment. The basement contains the conditioning machinery, constructed especially to meet the requirements of the experiments to be conducted in the laboratory and animal rooms in which atmospheric conditions can be controlled as they are in the test rooms.

Professor Winslow, who is head of the department of public health in the School of Medicine, has as associate directors in the Hygiene Laboratory Dr. Leonard Greenburg and Dr. L. P. Herrington, both of whom hold appointments on the staff of the medical school. The laboratory is now in full operation.

## THE EIGHTY-SEVENTH MEETING OF THE AMERICAN CHEMICAL SOCIETY

THE eighty-seventh meeting of the American Chemical Society will be held in St. Petersburg, Fla., from March 25 to 30.

A symposium, the general subject of which will be "The Physical and Chemical Properties of the Isotopes of Hydrogen," will be held on March 27 under the auspices of the Division of Physical and Inorganic Chemistry. Professor Donald H. Andrews, of the Johns Hopkins University, chairman of the division, will preside. Morning and afternoon sessions will be held.

The opening address will be delivered by Professor Harold C. Urey, of Columbia University, who was recently awarded the Willard Gibbs Medal of the Chicago section of the society for his discovery of heavy water. Professor Urey's topic will be "The Isotopes of Hydrogen." Dr. F. G. Brickwedde, of the U. S. Bureau of Standards, associated with Professor Urey in the discovery, will speak on "Vapor Pressure of Deuterium."

Professor Hugh S. Taylor, chairman of the department of chemistry at Princeton University, will discuss "The Hydrogen Isotope as a Research Tool in Chemical Kinetics." In the Frick Chemical Laboratory of Princeton University quantity production of heavy water through a specially constructed machine is under way, and biological experimentation to ascertain the effect of the new liquid upon animals is in progress.

Dr. E. R. Smith, research chemist of the U. S. Bureau of Standards, will present a paper on "The Isotopic Fractionation of Water by Physiological Processes," which he prepared in collaboration with Dr. E. W. Washburn, of the bureau, who died recently. Quantity production of heavy water was achieved by electrolytic methods devised by Dr. Washburn, who was to have been a leading figure in the symposium.

Other speakers and their topics will be: Professor F. Allison, of the Alabama Polytechnic Institute, "The Isotopes of Hydrogen by the Magneto-Optic Method of Analysis"; Professor L. C. Anderson, J. R. Bates and J. O. Halford, all of the University of Michigan,