first experiments, which lasted a week or more, the deuterium concentration reached very high figures of about 70 per cent., but the increase was very slow, as shown in a one-day experiment on a rat in which the muscles had reached only 19 per cent. when the liver was 47. An experiment on three mice is especially instructive. These mice were brought by injection to about the same concentration of D_2O and kept together in the same metabolism chamber. One was killed after 1 day and showed in the proteins of muscle and bone an exchange of 11 per cent., while in the internal organs it had reached 20 per cent. The second mouse was killed after four days when the percentage saturation in the muscle and bones was 25 per cent. and in the internal organs 37 per cent. The remaining mouse was now given ordinary water to drink, which in 5 days reduced the concentration of D_2O in the body fluids from about 2 to about 1 per cent. The deuterium content in the proteins of the internal organs went down very nearly in the same proportion, showing now a 40 per cent. concentration, but in the muscle (and bone) the absolute content of D went up further, raising the proportion to 76 per cent.

It seems out of the question that a breakdown and reconstruction of muscular tissue should proceed at anything like this rate, and we are reminded of the slow exchange taking place within molecules referred to above. An exchange of this type might in the living organism be correlated with the activity, and to test this suspicion the following experiments were made on frogs with a suitable concentration of D_2O, in which one leg was denervated, while the other was stimulated to twitches at two to three seconds interval over 24 hours. We found an exchange of about 9 per cent. in the leg kept quiet and 12 per cent. in the leg which had performed about 36,000 twitches with an aggregate duration of less than 30 minutes.

It can not be sufficiently emphasized that the experiments so far made are preliminary and tentative. At the same time it seems to me that the general lability of substances and tissues in the organism already revealed is of very great significance and that we may look forward to important developments.

With regard to the utilization of heavy water as an indicator we are strongly in need of a comprehensive study of the exchange in protein substances *in vitro* both static and dynamic, studying the influence of conditions like pH, temperature, salts and so on on the final equilibrium and the rate at which it is approached.

There are, I believe, great possibilities for the further use of the hydrogen isotope in biology, but it must be admitted that the somewhat cumbersome technique of purification and determination of the deuterium oxide is in the way of rapid progress along this line.

From this great country with its enormous resources we may perhaps even look forward to the separation of other biologically important isotopes which can be determined by specific gravity methods. Still I think that the radioactive isotopes are likely to become of paramount importance because the determination is comparatively easy and the activity remains unaffected by any chemical treatment, including ashing.

The radioactive isotopes to be used in biology must possess a fairly strong activity which generally means a short radioactive life. On the other hand, the life, as characterized by the time of reduction of the activity to one half, can easily become too short for biological or even chemical purposes.

A large number of isotopes have been prepared with half times between a fraction of a second to a few hours. These will not as a rule be available for biological research.

The half time of radioactive lead (thorium B) is 11 hours and of phosphorus 16 days, which is very convenient for our purposes. A radioactive sulfur can be generated having a half time of 60 days and reports are presented of carbon with a somewhat similar length of life.

I am exceptionally fortunate in having become associated with Professor Hevesy and through him also with Bohr. The study of radioactive isotopes is to be pushed forward in Copenhagen, and a powerful plant is being erected for their generation. We are determined to do the best we can, but we cordially invite both competition, cooperation and criticism.

SCIENTIFIC EVENTS

LETTERS AND MANUSCRIPTS OF T. H. HUXLEY

IN a letter to the London *Times* dated December 31, 1936, Lord Rayleigh, chairman of the Governing Body of the Imperial College of Science and Technology, London, and Sir Frederic G. Kenyon, chairman of the Friends of the National Libraries, have made an appeal for subscriptions to a fund to make possible the preservation of a unique collection of Huxley's letters and manuscripts, now in the possession of Mrs. Leonard Huxley. The letter follows:

"In your issue of February 14, 1936, you published an article by Sir Frank Heath describing the very interesting and historically valuable collection of letters and manuscripts relating to T. H. Huxley which are now in the possession of Mrs. Leonard Huxley.

There has been a general desire to preserve this unique collection as a whole and to house it at the Imperial College, where it could be studied by serious students and seen under suitable conditions by interested members of the public.

"In February last the governing body of the college issued an appeal to old students and friends of the college in the hopes of raising £2,000, the sum asked for the letters, and an additional £500 which is the estimated cost of binding and housing the collection. Before issuing this appeal they consulted the authorities of the British Museum and the Friends of the National Libraries, who are favorable to the scheme. The Friends of the National Libraries issued a supporting appeal to members of their association at the same time. Altogether a sum of £1,200 has so far been collected or promised. Of this, £464 has been received through the efforts of the Friends of the National Libraries, £150 has been granted by the Pilgrim Trust, £200 from one old student of the college, and £50 from Sir Robert Hadfield.

"The governing body and the council of the Friends of the National Libraries are most anxious to secure the additional money necessary soon. Otherwise it is probable that the collection will be broken up and lost to the country. It is possible that some readers of your paper have not yet heard of the appeal and would be willing to help to preserve the collection, which includes among other items of great interest almost the whole of Darwin's correspondence with Huxley, over 400 letters to and from Hooker, in addition to many hundreds of letters from Tyndall, Lyell, Herbert Spencer, Haeckel, Agassiz and many other men of great prominence in Huxley's time. It also includes many of Huxley's original manuscripts and notebooks.

"Contributions should be sent to the Secretary of the Imperial College, Prince Consort Road, South Kensington, S.W.7, or to the Secretary of the Friends of the National Libraries, care of British Museum, W.C.1."

RESEARCH ON METALS

THE rewards of cooperation in research in the field of metals through joint investigation of fundamental problems by physicists, metallurgists and chemists were discussed by leaders in these fields at a meeting held at the Massachusetts Institute of Technology on January 28 and 29 under the auspices of the institute and the American Institute of Physics.

The meeting emphasized the promising trend toward a most productive type of research in which technical workers bring to problems of fundamental interest the specialized knowledge and methods of their several fields. The very important results of joint research are nowhere more evident than at the institute itself, where many investigations are brought to successful conclusions through interdepartmental cooperation.

The purpose of the meeting was to discuss thoroughly recent developments in the physics and chemistry of metals, as well as the opportunities for still greater advances through the combined cooperative effort of all workers whose knowledge may in some way contribute to problems of mutual interest. From a half to one hour each was allowed for the presentation of important papers and ample time was given for discussion, thus permitting an interplay of viewpoints not possible in the usual scientific meeting.

Some of the more general papers presented were: "Research Problems in the Steel Industry," by Dr. E. C. Bain, United States Steel Corporation; "Inclusions in Ferrous Alloys," by Dr. A. B. Kinzel, Union Carbide and Carbon Company; "Flow Phenomena in Heavily Stressed Metals," by Professor P. W. Bridgman, of Harvard University; "Electronic Structures in Metals and Alloys," by Professor J. C. Slater, head of the department of physics of the Massachusetts Institute of Technology; "Corrosion," by Dr. J. R. Burns, of the Bell Laboratories; "Elastic Properties of Ferrous Alloys," by Professor A. V. de Forest, of the Massachusetts Institute of Technology, and "Chromium-Nickel-Iron Alloys," discussed by Dr. V. N. Krivobok, of the Allegheny Steel Company.

In another group of papers various techniques and their applicability were presented, while in the third group some especially complex scientific problems met with in ferrous alloys were discussed.

Arrangements for the meeting were in charge of Professor John Wulff, of the institute, who acted as secretary, and Dr. Harry A. Barton, director of the American Institute of Physics.

THE NORTHWEST SCIENTIFIC ASSOCIATION

THE thirteenth annual meeting of the Northwest Scientific Association was held on December 29 and 30, 1936, at the Davenport Hotel in Spokane, Washington.

President George F. Simmons, of the Montana State University, lectured at the general meetings on "The Mechanisms of Reproductive Periodicity in Mammals" and "A Windjammer Voyage to Treasure Island." Seven section meetings were held as follows: Bacteriology-Public Health, Botany-Zoology, Chemistry-Physics-Mathematics, Education-Psychology, Forestry, Geology-Geography and Social Science.

Officers elected for 1937 were: *President,* C. C. Todd, dean of the College of Letters and Science, State College of Washington, Pullman; *Vice-president,* J. H. Ramskill, professor of forestry, Montana State University, Missoula; *Secretary-Treasurer,* O. W. Freeman, State Normal School, Cheney, Wash.