SCIENCE NEWS

Science Service, Washington, D. C.

HEAVY OXYGEN WATER AT MANCHESTER UNIVERSITY

WHAT is probably the world's rarest liquid, "heavy oxygen water," is now being produced at the University of Manchester by means of a recently constructed diffusion apparatus.

Only a few drops of heavy oxygen water exists. The new apparatus in which J. B. M. Herbert, lecturer, and Professor M. Polanyi, of the university, demonstrated the production of heavy oxygen water is designed to produce 20/1000ths of a gram of water per day, which is about four tenths of a drop.

One atom out of every hundred of the oxygen atoms in heavy oxygen water has a mass of eighteen instead of the usual mass sixteen of ordinary oxygen. In ordinary water the normal proportion is about one in 500. Concentration of the heaviest oxygen is considered a real achievement, since the difficulties are much greater than in separating the famous three kinds of hydrogen recently discovered.

Professor G. Hertz, of Berlin, made the world's first sample of heavy oxygen water and presented the precious ten drops (half a gram) to Professor Polanyi, who was formerly professor of physical chemistry at the Kaiser Wilhelm Institute. The isotopes or atom varieties of neon, gas now used in electric signs, were also separated by Professor Hertz.

The apparatus for producing heavy oxygen water is very complex and consists of nine mercury vapor diffusion pumps circulating gas through porous clay called steatite. The very slight difference in weight between the light and heavy oxygens in the water vapor makes the concentrating process slow and tedious. Even compared with its use upon gases like neon, the process is slow because the water vapor condenses upon the surfaces of the clay tubes.

In an exclusive interview, Mr. Herbert explained to a representative of Science Service that higher concentrations of heavy oxygen water could be obtained either by repassing or by using a larger number of diffusion units. Five per cent. concentration is obtainable by the use of diffusion. By a combination of methods, Mr. Herbert believes that in time pure 100 per cent. heavy oxygen water might be obtained. But it would probably take years to achieve this goal.

Professor Polanyi is at present in Moscow where he is consulting with Soviet scientists engaged in similar work.

NEW MEASUREMENTS FOR THE ATOMIC WEIGHT OF HYDROGEN

NEW weighings of the atoms just completed at the University of Cambridge by Dr. F. W. Aston give confirmation of the announcement made to the Royal Society recently by Lord Rutherford and his colleagues that some of the weights of common elements need revision.

Using a partially completed mass spectrograph or atom weigher, Dr. Aston announces in a letter to *Nature*, the following masses: For hydrogen, 1.0081; for deuterium or hydrogen of mass two, 2.0148; for helium, 4.0041; for carbon, 12.0048. The famous Aston value for light-weight hydrogen determined by him in 1926 was 1.0078, contrasted with the new value of 1.0081.

What has happened now is as though the official pound weight of a nation were found to be slightly inaccurate. The weights of atoms are referred to the weight of oxygen taken as 16, either as it occurs on the average in nature or as the lightest of the three varieties, depending upon whether the determination is by chemical or physical methods.

Professor M. L. E. Oliphant, A. E. Kempton and Lord Rutherford, working in the Cavendish Laboratory, first suggested the need of revision as a result of the energies with which bombarded atoms artificially disintegrated. The distances the particles shoot out from the exploding atoms allow calculations of the masses of the atoms.

Dr. Aston admits that these disintegration experiments as atom weighers are "much more delicate but less direct." Dr. Aston's new atomic weights are as yet provisional and in no case does he claim greater accuracy than one in 10,000.

Scientists are interested in the slight differences in atomic weights discovered because they are of large importance in computing the energy within atoms and developing theories as to the existence of isotopes or varieties of atoms.

"I am never likely to regret the underestimate of hydrogen's atomic weight that I made in 1926," Dr. Aston said, "however serious it may ultimately turn out to be, because of the fundamental part it played in encouraging the search for heavy weight hydrogen (called deuterium) which was discovered in America."

The discovery of deuterium recognized by the recent Nobel prize award to Professor Harold C. Urey, of Columbia University, resulted from the supposed discrepancy between the atomic weight of hydrogen determined by chemical and physical means after it had been discovered that oxygen, the standard element, was actually triplets instead of just a single element. If Dr. Aston had arrived at the present value of hydrogen's mass earlier, the successful search for heavy hydrogen might never have been started.

A NEW METHOD FOR STUDYING THE STRUCTURE OF THE BRAIN

A NEW anatomic method for studying the intricate structure of the human brain has been developed by Dr. Joshua Rosett, professor of neurology at Columbia University and scientific director of the Brain Research Foundation, and is now being used in his laboratories at the College of Physicians and Surgeons.

The first step consists in what its inventor calls "automatic internal dissection." Instead of using a knife to cut cross-sections of the brain for study, the brain

is literally exploded, blown apart into natural layers, instead of artificial sections.

The cerebrum is fixed, the covering membranes removed and the specimen wrapped in gauze and many layers of bandages. It is then placed in a steel, air-tight container, strong enough to withstand several pounds of gas pressure. The container is connected with a tank filled with liquid carbon dioxide gas.

The specimen is subjected to the high pressure of the gas, which gradually dissolves in the fluids of the brain in one or two days. The valve of the container is then quickly opened. The sudden removal of the pressure explodes the tissue, which is, however, held together by the bandages.

Instead of becoming disintegrated the brain is dissected into a great number of layers along the natural lines of cleavage. To use a homely analogy, imagine the brain substance, before being exploded, to be as homogeneous and compact as that of a turnip, in which no layers are discernible, and after explosion, to have somewhat the formation of a cabbage. The numerous layers automatically dissected by the explosion, and corresponding to the leaves of the cabbage, can then be separated by hand with great ease.

After this they are flattened between plates of glass, fixed in that position, sectioned along the flat planes, stained and mounted on glass slides. The result is that when the microscopic preparations are made the nerve fibers of the cerebrum can be traced from end to end, which is impossible by any of the cross section methods hitherto employed.

THE RÔLE OF HORMONES IN THE DEVELOPMENT OF THE EMBRYO

ATTEMPTS at ectogenesis or "babies born in a bottle" have been checked, temporarily at least, because certain hormones necessary to the early growth of the egg and embryo act only indirectly through the mother's tissues.

Discovery of how these four essential hormones act was made by Professor Gregory Pincus, of Harvard University. Professor Pincus's success in fertilizing rabbit eggs in a test-tube, announced last year, attracted wide notice as a first step toward ectogenesis, a process long dreamed of by romantically-minded scientists. In this earlier experiment the eggs were fertilized in a test-tube and then brought to birth in the body of a foster mother rabbit.

His latest efforts were directed toward the next step, continuous growth of the eggs and embryos outside the mother, a feat as yet unaccomplished by scientists. Professor Pincus tried to do this by adding certain gland products to the material in which the eggs were placed for growth outside the mother's body.

These are thyroid and pituitary hormones which affect the maturing of the egg in the ovary; oestrin, a primary female sex hormone affecting the later growth of the eggs; and progestin, a female sex hormone affecting the growth and implantation of the eggs in the walls of the uterus.

Allowing the egg to develop normally and removing it from the mother's body after it had become implanted on the walls of the uterus, Professor Pincus succeeded in keeping the embryo alive in a culture dish for about forty-eight hours. At this stage blood vessels began to form and the heart began beating, but all attempts to keep the embryo alive beyond fifty-six hours after separation from the mother failed.

Adding to the culture the hormones which brought the embryos through the same periods in the mother's body was also unsuccessful.

From the fact that the cultures still died at the same critical points, even after the hormones had been added to their nourishing growth medium, Professor Pincus concluded that the hormones act on the eggs and embryos through the maternal tissues rather than on the eggs directly.

ITEMS

RADIOSODIUM, as a possible substitute for natural radium in yielding radiation useful in cancer treatment and industry, is now being produced "in somewhat greater quantities than reported several months ago" when Professor Ernest O. Lawrence, of the University of California, made known his discovery. Because sodium as a constituent of common salt is one of the most common things in our daily life and because salt solution can easily be injected into the blood stream, it is expected that the new radiosodium will have practical applications in the future. Professor Lawrence makes radiosodium by bombarding sodium with the charged hearts of double weight or heavy hydrogen, called deutons. When the deutons are flung with an energy of 1,750,000 electron volts, sodium gamma rays are given off from the new radiosodium formed with energies of 5,500,000 electron volts. These are the most penetrating gamma rays. Even more important, the radiations continue to be given off for fifteen hours.

POTASH from the waters of the Dead Sea in Palestine has now reached a production rate of between two thousand and three thousand tons a month. The initial rate, only two years ago, was not more than one thousand tons a month. The principal by-product of the potash industry is bromine, which now equals 74 per cent. of the total British requirement for this chemical. Other by-products in economic prospect are potassium sulphate and calcium sulphate, both meeting fertilizer needs of Palestinian soils.

SKULLS are not the infallible indices to race which they were once thought to be, according to Dr. Aleš Hrdlička, curator of physical anthropology of the Smithsonian Institution. They change in shape and relative dimensions within a few generations if the life environment of a people changes. From a study of a large series it will be found that there is no such thing as a line of racial discontinuity; they grade off insensibly into other skull types in all directions. Assertions that the Scandinavian region was once inhabited by a negroid people, and that modern Eskimos are like Europeans of 14,000 years ago, based on the study of skulls, are characterized by Dr. Hrdlička as erroneous.