SCIENCE NEWS

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HYDROGEN ATOMS

EXISTENCE of the neutron, reported in experiments at Cambridge, England, will probably make simpler the explanation of the double weight hydrogen atoms that were recently discovered through joint work at Columbia University and the U. S. Bureau of Standards.

This is the opinion of Dr. F. G. Brickwedde, physicist at the U. S. Bureau of Standards, and one of those who discovered the novel hydrogen atoms of isotope or mass number two.

Ordinary hydrogen is known to be a nucleus of a single proton or positive charge of electricity surrounded by an electron or negative charge of electricity. The neutron is postulated to have the same atomic ingredients, but the proton and electron are so closely associated in forming the neutron that it is left with no electric charge.

Dr. Brickwedde's suggestion is that the nucleus of the heavy weight hydrogen, with approximately twice the atomic weight of ordinary hydrogen, has its heart or nucleus made up of one neutron and one proton, with a whirling orbital electron on the outside that makes the double weight hydrogen isotope neutral like the ordinary hydrogen atom.

If neutrons, as a sort of elementary element without charge, are floating about like a gas, it would be far simpler for a proton to meet up with a neutron and combine to form a nucleus of hydrogen isotope two than for two protons and one electron to get together to form the heart of heavy weight hydrogen atom.

Formation of the heart of the heavy hydrogen atom from a neutron and a proton in this way may therefore prove to be a first step in element building.

THE DEFLECTION OF LIGHT

ADDITIONAL photographs of the stars visible close to the sun at the time of a total solar eclipse are required as a further check on the Einstein theory of relativity.

The making of such observations was urged at a recent meeting of the Royal Astronomical Society by Sir Frank Dyson, Astronomer Royal, and Sir Arthur Eddington, of Cambridge University, following a paper presented by Dr. Erwin Freundlich, director of the Einstein Tower at the Potsdam Observatory, Germany. A full report of the meeting has appeared in *The Observatory*, a British astronomical monthly.

According to Einstein's theory as announced in 1915, a beam of light from a distant star will be pulled slightly inwards as it grazes a massive body like the sun. A similar deflection, but considerably smaller, was predicted on the basis of Newton's theory, previously accepted. Stars close to the sun can not ordinarily be photographed because of the great glare, but at eclipse time, when the moon covers the solar disc, they are visible. They were photographed at the eclipse visible in Principe, West Africa, in 1919, by Sir Arthur Eddington, of Cambridge, as well as by other astronomers at later eclipses.

All results so far announced, except those from observations by Dr. Freundlich at the eclipse of 1929 in Asia, agree closely with Einstein's prediction that a beam just grazing the sun's surface would be deflected 1.75 seconds of arc. This minute amount is about a thousandth part of the diameter of the full moon. The eclipse of next August will not be suitable for these observations, for there will be no bright stars near the sun.

With the photographs made in 1929, Dr. Freundlich took special pains to check any distortion of the plates. He used two cameras, and at the same time that he photographed the eclipsed sun and the surrounding stars he photographed on another plate a field of stars about 25 degrees away. Some months later both fields of stars, then in the night sky, were rephotographed with the same cameras and the results compared.

Dr. Freundlich pointed out that most of the stars in the eclipse field were on one side of the sun. They should be equally distributed around it for the best results. However, his calculations show the deflection to have been 2.16 seconds, instead of 1.75. He then checked the work of the Lick Observatory party in 1922 at an eclipse in Australia and, by using corrections which he said they neglected, obtained 2.27 seconds for their result.

In commenting on Dr. Freundlich's remarks, both Sir Frank Dyson and Sir Arthur Eddington expressed skepticism, though both urged the need of more observations. Sir Frank called attention to the fact that none of the observations yet made were without drawbacks and that the stars observed by Dr. Freundlich were not uniformly distributed.

COLORED ARTIFICIAL STONE

MAKING stone take on the delicate colors of the beautiful luna moth is one evidence of the efforts being expended to gain relief in architecture from the monotony of a machine age. That is what Professor Fred R. Lear, professor of architectural design at Syracuse University, has told the American Concrete Institute.

Professor Lear explained how he reproduced the varied shadings of the insect with a mixture of cement, crushed stone and color pigments. It is through this medium of synthetic stone, he stated, that the demand for appropriate color in home, school and skyscraper is being satisfied.

Artificial stone, he said, has been known for some time, but only recently have colors in stone been appreciated for their intrinsic value, and never before has mass production of color in building enterprise been so keenly taken into account.

Metallic oxides are largely used to achieve the desired intensity and shading of the color in the laboratory material. Unlike natural stone, all the hues of the rainbow can be duplicated.

The stone is molded into any necessary shape without the loss from chipping which is characteristic of ordinary stone work. The cast stone can be used alone or in combination with other building materials such as brick. In this case it not only harmonizes with the brick color, but also serves to bring the color out fully.

Cast stone is made with material like crushed marble, or granite, as a base according to the quality desired in the resulting product. It is as durable as any natural stone of its price level and retains its color much longer. In the early days of cast stone, imitation of natural products was the chief aim. While it is still possible to duplicate these stones, the molded material is now a distinct, individual creation.

HELIUM PURIFICATION

A NEW plant for the purification of the rare gas helium, which is used in Navy airships, is being planned by the U. S. Navy Department.

The new plant, for which bids will be opened on April 6, will be built at the Navy's new airship base at Sunnyvale, Calif. It is to have two units, each of which is to be a complete and self-contained outfit for the repurification of helium. Each unit will have a capacity of 15,000 cubic feet of impure helium per hour.

The Navy finds it necessary to maintain such a repurification plant because no fabric has yet been found which will completely exclude air from the airship cells containing the precious helium. The cell walls are now made of several layers of latex with a filler of gelatine between each two layers. This material contains no perceptible pores through which air could leak, but minute quantities of air do find their way through, perhaps by mixing with the fabric coating and becoming free again on the other side. The minute amounts of air thus admitted are very important, however, for impurities amounting to only one per cent. in the helium make a difference of almost two tons in the lifting power of the airship.

A novel feature in the specifications of the new plant as issued to firms interested in bidding is the requirement that carbon dioxide shall be removed from the helium through the use of lithium hydroxide, a chemical used in alkaline storage batteries. Lithium hydroxide has never before been used commercially for this purpose. Methods used formerly for the removal of carbon dioxide made use of sodium hydroxide. The building and operation of the plant will be under the direction of the Navy.

The specifications require that the helium shall be made at least 98.5 per cent. pure. The Navy has recently been able to attain a purity higher than 99 per cent. by a new process, whereas previously 98 per cent. had been considered satisfactory.

PLANTS TO DETECT TOXIC GASES

TOMATO plants are being used to detect illuminating gas leaks and the presence of other toxic gases in laboratories and greenhouses at Yale University, according to Professor Carl G. Deuber, of the department of botany. These plants are being used in the same way that canaries are used in mines.

In the presence of the merest traces of toxic gases the younger leaf-stems of the tomato plant grow downward, due to a more rapid growth of the cells on their upper sides. Professor Deuber found that this is an absolutely reliable test for illuminating gas leaks.

The effect of various lights on plant growth is being investigated in the Yale laboratories. "Since daylight is a complex of all colors of the solar spectrum, experiments with different qualities of light are being conducted," Professor Deuber reports. "By means of special boxes fitted with spectral glasses that transmit only certain portions of the solar spectrum, we are able to note the influence of red light, orange light, blue light, etc.

"In addition to the intensity and quality of light that is known to influence plant growth, it is also realized that the photo-period, *i.e.*, the length of exposure of a plant to light each day, may determine whether that plant will continue developing leaves indefinitely or come into bloom, even though it is but a few inches high.

"Light is but one factor affecting the growth of plants. Soil moisture, supply and kind of mineral nutrients, high and low temperatures, the presence of toxic agents in the soil or air, as well as many other factors, exert marked effects on plants and are subject to experiment in a greenhouse. It makes a surprising difference in plant growth when too little or too much moisture is present in the soil. The deficiency of any one of the necessary mineral nutrients for plant growth can be readily followed with water or sand cultures in which the root environment can be accurately controlled."

FOREST FIRES

THE forest fire season, which begins in the East during the latter part of this month, is expected to be much less disastrous than that of memorable 1931, according to Mr. Roy Headley, of the U. S. Forest Service, in a statement made to Science Service. Despite the alarm occasioned by the burning in the Florida Everglades, there are no fires of any consequence in national forests now.

Rain and snow have fallen heavily throughout the West this winter, breaking the ten-year precipitation record for southern California. As a result ground water is being replenished in national forest states and the opening of the western fire season will probably be delayed until the middle of June. Last spring, the excessive drought and the high, parching winds made conditions in the Northwest acute by April.

The cycle of declining precipitation, which has extended over the last dozen years in the West, is believed to be at an end, and normal weather is hoped for, Mr. Headley stated. For the last six or eight years the increased use of the national forests and uncommonly dry weather have made the job of the forest service more difficult. Improvement in personnel and equipment has made the battle against fire about evenly matched. Now, with a favorable smile from the weather, the Forest

Service should have the upper hand in fire prevention and spectacular results during the next two or three years can be expected.

The problem in north Idaho, however, will be a severe one to cope with. Shutting down of the mills because of the economic depression will bring the specter of incendiarism more into evidence. Men out of work, Mr. Headley said, will deliberately start fires in hopes of getting a job fighting them.

Likewise in this area and in western Montana, there will be 1,200 fewer men in the woods during the three months of the fire season. Decreased Federal appropriations have stopped the work on roads and trails in the national forests and the workmen, who are trained to fight fire, will consequently be absent.

RADIO SETS IN THE FOREST SERVICE

FIRE fighters in national forests will go into the field this summer to try out for the first time radio sets they can carry on their backs. Each set, consisting of both transmitting and receiving units, weighs but ten pounds, and will enable the forest personnel to keep in constant touch by signal code.

The approaching fire season will also see the introduction of the improved radio outfit which permits transmission not only of code but of voice as well. These sets, greatly simplified and extremely reliable, weigh but twenty-five pounds and can be transported on horse-back. If funds are available several hundred of them will be purchased and put into use.

The 25-pound set is a refinement of the 78-pound outfit experimented with in the Columbia National Forest during the summer of 1930. Strenuous tests, Forest Service officials said, have shown the lighter set to be "almost too good to be true." It permits the broadcast of the voice up to a distance of a hundred miles.

The new radio sets will find wide usage in fire fighting activity. Whenever a member of the forest personnel is away from a telephone he can make his report and receive orders by radio. This is frequently the case in many areas during acute periods of fire fighting. Both the ten- and twenty-five-pound sets will be used under these conditions, while heavier sets are also slated for use on forest service boats in Alaska to make possible communication with points on shore.

Wide-spread use of the radio sets is necessarily dependent upon financial considerations. The new instruments can not be counted on to put an end to forest fires. Fire control, however, will undoubtedly be greatly facilitated.

ITEMS

ULTRA-VIOLET light, already of proved worth as a detective in searching out hidden writing and exposing bogus art, now protects dealers in honey against adulterated sweets. Two Danish investigators, S. A. Schon and J. Abildgaard, have found that genuine honey absorbs ultra-violet radiation at a fairly even rate, but artificial honey has a pronounced "absorption band" at one spot—that is, one place in the spectrum of the radiation passing through it where no rays come out. This absorption band is due to the presence of a substance known as hydroxy-methyl-furfural, characteristic of artificial honey but absent from the genuine product. By the study of this absorption band it is even possible to obtain a quantitative estimate of the amount of adulterant used in a suspected sample.

A NEW type of filter, with interstices covered with silver, has been tested at the Pasteur Institute, of Paris, by Dr. Nicolas Metalnikov, and found to confer upon the filtered water the power to destroy living bacteria. The filter is made by adding chloride of silver to the moulding clay and baking at a high temperature of 2,200 degrees Fahrenheit. According to its inventor, Georges Lakhovsky, the water which passes through the filter does not contain any silver and is perfectly harmless; yet it retains for several days the power to destroy resistant bacteria like the common Bacillus coli and Bacillus typhosus, which causes typhoid fever. The bactericidal power of the water that has passed through the silvered filter is claimed to be entirely due to the ionization of the water, and it disappears if the water is boiled for a few minutes. During its passage through the filter the water becomes slightly alkaline.

RADIO listeners near high-voltage power lines should enjoy clearer reception as the result of researches of Professor F. O. McMillan, of Oregon State College, who has proved that the leakage of current across insulators is a source of troublesome noise in nearby receiving sets and has found ways of overcoming this nuisance. These leaking currents set up oscillations of radio frequency, Professor McMillan explained in a report to the American Institute of Electrical Engineers. In tests which he conducted in a darkened room, every time a leakage from a high voltage line was observed, noise occurred in a radio set. The noise was often heard before the leakage became visible. The leakage, and hence the interference, can be done away with, it was pointed out, by designing the insulators so that air near their surfaces is not overstressed electrically. The stresses might also be equalized by properly coating portions of the insulator with a conducting material.

MILK sugar, or lactose, helps to build up a strong, bony structure in the growing chick, Dr. E. B. Hart and his associates at the University of Wisconsin have found. Lactose is an important part of the milk produced by animals, making up nearly two thirds of all the solids in human milk and from four fifths to one half of those in whole cow's milk. In skim milk or butter-milk, lactose makes up half of the total solids. The Wisconsin investigators found that lactose fed as from 10 to 40 per cent. of the chick ration gave a partial control of rickets and was half as effective as artificial sunlight in producing strong bones. The milk sugar also helped the chicks to make better use of the lime in their feed.