SCIENCE NEWS

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CREATION OF ARTIFICIAL RADIUM-LIKE ELEMENTS

IF the process of making heavier radioactive elements out of lighter ones, which is reported to have been discovered by Professor Enrico Fermi in Italy, can be made efficient enough it may lead to a practical method of creating useful radioactive substances for medical purposes or scientific study.

When neutrons strike the nucleus of a light element they try to make trouble by kicking out an alpha particle or helium atom core. If this proves too difficult they bounce out themselves. Never in the past have they been found to join the nucleus in peace. Still, physicists have felt that in the stars or wherever else matter is built up many such peaceful unions must take place.

Now Professor Fermi reports that he has made neutrons stick to the heaviest element known, namely, uranium, which has almost 238 times the mass of hydrogen, the lightest element. If this prove true a new element will have been formed heavier than any known heretofore.

The heavy product seems to shake off an electron and this causes it to break the record for highest nuclear charge, namely 93. It may be that one of the lighter forms of uranium is attached. In this case the mass would be only 235 but the nuclear charge would still be 93.

Apparently this process may be very efficient because the uranium nucleus is so heavy, large and complex that the neutron can fritter away its excess energy within the uranium and then be too exhausted to leave. After a few seconds an electron leaves instead and then the fun begins. For the new element is radioactive and keeps changing by sending out alpha, beta and gamma rays until lead is formed.

The first problem that the new experiments are likely to solve is the old mystery of the source of the actinium series. Apparently nature has been doing slowly what Professor Fermi just learned to do rapidly.

Here in the United States we can produce neutrons a hundred times as copiously as could Fermi. It will be interesting to try the trick on other heavy atoms like thorium or ionium.—R. M. LANGER.

BLACK PHOSPHORUS MADE BY HIGH PRESSURE

BY squeezing atoms of phosphorus with pressures of seven tons to the square inch Professor P. W. Bridgman, research physicist of Harvard University, has just been able, for the first time in the history of science, to make this chemical element change its color from white to black by pressure alone.

Professor Bridgman's latest achievement in the field of high pressures, in which he is a world-famous authority, is reported in a letter to the editor of *The Physical Review* just released.

In the squeezing process, where the pressures become comparable with those found only inside the earth, the phosphorus changes from the dangerously inflammable waxy-white form which has to be kept under water to prevent its spontaneous burning, into a darkish, non-inflammable relative.

Phosphorus, while never found free in nature because of its affinity for other chemical elements, is widely distributed throughout the world. It is, as one example, an essential ingredient of the protoplasm of the human body.

INFANTILE PARALYSIS IN CALIFORNIA

THE biggest infantile paralysis epidemic since 1931, the year of the second largest outbreak in history, is threatening the country's health. Reports received by the U. S. Public Health Service show a large weekly increase in the number of cases and a greater total than was reported at this time in 1931, when that year's epidemic was already under way.

The outbreak this year has centered in Los Angeles and vicinity. Of the total of 179 new cases reported for the country as a whole for the week ending June 2, 163 were reported from California. For the previous week there were 118 cases reported from the whole country with 92 of them in California.

Health officials can not yet tell whether this year's outbreak will spread throughout the country and reach the proportions of the 1931 or 1916 epidemics. No better means of protection against the disease are available now than at the times of the previous outbreaks. Parents are warned to keep their children away from crowds where the danger of exposure is greatest, and to watch for symptoms of slight illness or indisposition so as to catch the disease in its early stages when treatment is most effective. New methods of treatment have improved the chances not only of saving the life of the infantile paralysis patient, but of warding off the paralysis and crippling deformities which were nearly universal sequels to the disease in former years.

In California blood serum from recovered patients is being used in the hope of giving protection against the disease.

AMEBIC DYSENTERY

HEALTH officials at the Conference of State and Provincial Health Authorities of North America, held at the headquarters of the U. S. Public Health Service in Washington, agreed that amebic dysentery is no more of a danger in Chicago now than in any other city in the country.

Discussion of the outbreak of last summer and fall brought out the following points:

Plumbing is the first line of defense against amebic dysentery.

The Chicago outbreak of amebic dysentery was the first due to infected water that has ever occurred in a civilian population anywhere at any time; the disease has always heretofore been traced to infected food

handlers. Sanitary inspection of plumbing when a building is erected is not enought to protect the public health. Such inspections should also be made at later dates to detect defects that may result from changes in the plumbing system after the building has been in use.

When Dr. Herman N. Bundesen, health commissioner of Chicago, described at the conference the fight made by the city against the amebic dysentery outbreak, he reported that 660 of the public buildings and hotels in the city had been rigidly inspected and all defects in plumbing corrected.

The plumbing in the Chicago hotel which was found responsible for the outbreak there is probably no different from plumbing installed in any building twenty to thirty years ago. Because of this and the fact that five out of every hundred persons in the general population are carriers of amebic dysentery, the disease may break out anywhere in the country at any time.

The disease did not spread throughout the country from the Chicago epidemic, no material outbreaks elsewhere having been traced to Chicago except those cases known to have been contracted in Chicago.

Amebic dysentery is probably a factor in the present increase of cases of so-called appendicitis. Many amebic dysentery cases are known to have been wrongly diagnosed as appendicitis and the mistaken diagnosis probably has not been detected in many more cases.

RAINS IN THE NORTHWEST

RAINS in the Northwest during the past few days should save the government millions of dollars in relief outlay, through enabling farmers to sow forage crops in land burned clear of small grain crops, thus salvaging at least a part of the cattle that would otherwise have to be sacrificed.

This does not mean, however, that there will be no need for relief in the Northwest, nor that the drought is broken. It merely means that the heavy rain, eagerly soaked up by the parched ground, puts the soil into condition for prompt germination of quick-growing second-crop plants which the farmers will be sowing as fast as they can get seed into the ground.

The rain, which in some places exceeded in twenty-four hours all the precipitation that had fallen during the previous three months, had nothing abnormal about it. It was an entirely normal, "old-fashioned" rain, brought by the same kind of a northwesterly storm that carries most of the summer weather in the Northwest and Midwest. The usual storm track follows a course up the valley of the Mackenzie River in northern Canada, along the Great Plains, and down the Missouri River Valley through the Midwest, usually recurving to the north and leaving the continent *via* the St. Lawrence Valley. The recent storm that brought the rain did not dip so deeply into the country as most of its tribe do.

It is really the drought, not the rain, that is the abnormal phenomenon. Ever since last autumn, the storm track has lain across northern Canada to the Hudson Bay region, thence southward through the Central Eastern states. Thus the East got an unprecedented winter, lasting until well into spring, while the West basked in a mild winter—which was nevertheless already a direfully threatening drought, bringing the menace, which has since been realized, of worse drought yet to come.

GRASSHOPPERS IN THE NORTHWEST

GRASSHOPPERS, which have been a menace second only to the drought itself in the Northwest, may receive a check in the Dakotas and Montana through the providential rains that have just fallen in that country.

W. R. Walton, of the Bureau of Entomology, explained to Science Service that the hordes of 'hoppers, which have not yet reached the flying stage in this northern part of their range, have been giving a desperate time to farmers and the crops of federal and state scientists who are in the field against them. Poison bait has been spread several times, but the air has been so dry that the moisture soon disappeared from the bait, so that the insects would not eat it.

The rain, Mr. Walton stated, will give the grasshopper fighters a breathing space, and longer time in which to carry on the battle. By improving moisture conditions, it will also probably keep the poison bait in edible condition longer.

The grasshopper situation in the West is very bad this season, Mr. Walton continued; worse, even, than had been expected. Undeterred by rains or anything else to favor man and injure them, they have been swarming in threatening hordes all down the Great Plains country as far as Texas, and thence through the southwestern states into California. In the southern areas they are already winged.

It is probable that 1934 will be remembered as a bad grasshopper year, as well as a year of unprecedented drought.

DETERMINATION OF GRADES OF COAL

EXACT specifications for every type of coal can now be had to show the household and industrial consumer the actual value of his purchases.

After seven years of effort towards complete classification, charts and tables have been published by the American Standards Association which list in every-day terms the different grades of coal and tell their respective values as fuels.

In ordering coal the cautious buyer can for the first time be assured of the quality and texture of his purchase by listing the specifications for whatever grade is adapted to his uses. The hit and miss method of buying is eliminated.

For instance, "(62–146)na" on an order blank would mean a coal containing 62 per cent. of fixed carbon, that part of the coal which determines its heating capacity, and 14,600 units of heat per pound. The parenthesis indicates that the coal is to be mineral-free, while "na" means non-agglutinating, that is, that the lumps will not stick together. These tables, in which the four main types, anthracite, bituminous, subbituminous and lignite, are divided up into thirteen grades, show all the characteristics of the various kinds, with symbols to represent each characteristic.

The specifications will be used by the NRA as a basis for classifying the output of mines.

In purchasing the 500,000,000 tons yearly output of over 6,000 mines in this country the average industrial or household consumer formerly had very little idea about the properties of coal which should be scientifically tabulated to show the one best adapted to any particular use. For over a hundred years many systems of classifying coal have been used, but none has been adopted generally.

THE SPEED OF AIRPLANES

AMERICAN planes fly at greater speeds than European planes both in mail and passenger service, but their speed is above the standard for greatest economy.

In America 150 miles an hour has been adopted as the cruising speed in general passenger flying and 200 miles per hour is achieved by aircraft carrying the mails, whereas in Europe 100 miles per hour is the average.

F. M. Green, of the Armstrong Siddeley Motors, Ltd., British manufacturers of airplane engines, who has reported to the Institute of Aeronautical Sciences a study of the most economical speeds at which airplanes may fly, finds that the speed of our planes is higher than that which gives the greatest economic efficiency.

He considers that the most economic speed is 130 miles per hour with the lowest safe horsepower of 62 hp. per thousand pounds weight. An average American eighteen-passenger plane has two 625 horsepower engines and weighs, fully loaded, about 20,000 pounds. This amounts to 62½ horsepower per 1,000 pounds, which is almost exactly the figure computed by Mr. Green for British planes. Therefore, according to his computations, our haste in getting from point to point makes waste insofar as fuel consumption goes.

He has also found, in examining the problem of economic speeds, that an increased altitude where the air becomes rarefied, raises the figure for greatest efficiency. At 7,500 feet 140 miles per hour is necessary to get the greatest value from the fuel consumed.

ITEMS

JUPITER'S supposed tenth moon has turned out to be only an asteroid or minor planet, one of hundreds of such small objects that circle in the heavens between the orbits of Mars and Jupiter. The Harvard College Observatory, American clearing house for astronomical information, has received a telegram from the first observer of the deceptive pin-point of light, Dr. H. M. Jeffers, of Lick Observatory, Calif., stating that further observations, as well as an orbit calculated by himself and his associate, A. B. Wyse, make it practically certain that the object is an asteroid. The addition of a possible tenth member to Jupiter's large family of moons was announced after scanning of photographs made on May 9 showed a minute fleck of light near the eighth satellite and having the same apparent motion. At the same time, however, the cautionary statement was made that the tiny celestial stranger might turn out to be an asteroid, as has since proved to be the case.

BOTH the northern and southern hemispheres of the sun are decorated by spots. A northern spot has a diameter of 19,000 miles, while one in the south measures 14,000 miles. Dr. Seth B. Nicholson, astronomer in charge of solar observations of the Carnegie Institution's Mount Wilson Observatory, at Mount Wilson, Calif., explained that there was a spot on the sun's face in April that was an earlier stage of the 14,000-mile diameter spot. At its maximum it was 35,000 miles in diameter including its outer portion of penumbra. A new small group of spots recently appeared on the sun, making four groups in all. Thus far these spots have produced no change in the earth's magnetic field.

PSYCHOLOGICAL methods so aided the recovery of 19 patients suffering from gastric disturbances that within six weeks they were eating anything they wanted without ill effects, it was reported to the New York Branch of the American Psychological Association by Dr. M. N. Chappell, of Columbia University, and his associates, Dr. J. J. Stefano, of Brooklyn Hospital, Dr. J. S. Rogerson and Dr. F. H. Pike, of Columbia University. The symptoms of the patients were caused by increased activity and tension of the digestive system which in turn was caused by worry and other emotions. Application of the psychological laws of learning and forgetting enabled the patients to forget the ideas upon which they had been dwelling, and so relieve the physical condition.

BUCKWHEAT beer and buckwheat soup regaled the inhabitants of ancient Tibet, no less than buckwheat cakes, according to Dr. Berthold Laufer, curator of anthropology at the Field Museum of Natural History, who has lately been looking into the origin of this supposedly most American of breakfast-cake materials. Our acquaintance with buckwheat is of about the same date as our acquaintance with America itself: buckwheat was introduced to Europe from the Orient some time in the fifteenth century, and to America in the sixteenth. Its original home seems to have been in the Himalayan uplands. There it has been in cultivation for at least two thousand years. Its cultivation spread first into China and Manchuria, where there are literary allusions to it of great antiquity. Buckwheat is not a wheat, or indeed any kind of a grain, in its botanical relations. It is a very close relative of the common smartweed of our roadsides.

THE slow, gradual chemical processes that decay leather over periods of many years have been speeded up to take place in a few months' time by U. S. Department of Agriculture chemists in efforts to discover and prevent what makes leather "age." By developing what is described as a heated gas chamber all the effects of decades of deterioration can be studied in a short time. This rapid analysis may permit the discovery of new methods of tanning which will lengthen the life of leather products. In reporting the tests R. W. Frey and C. W. Beebe, of the Bureau of Chemistry and Soils, say that their results agree with others in showing that even such small amounts of sulphur fumes as are present in the atmosphere of our cities are sufficient for the general breakdown of leather.