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DISINTEGRATION OF THE LITHIUM ATOM

USING atomic bullets speeding with the energy of over 700,000 electron-volts, Professor E. O. Lawrence, of the University of California, and his associates, Dr. Livingston and Milton G. White, have succeeded in smashing the lithium atom into two alpha particles or ionized atoms of helium gas.

Professor Lawrence thus confirms work done by British physicists who used lower energy protons as the bombarding projectiles. They found that protons shot at the lithium atoms combined with them and released energy.

A special apparatus that imparts high energies to atomic particles by whirling them in a magnetic field was used in the investigation. With this machine, designed by Professor Lawrence and Dr. Livingston, serving as a source of proton bullets or hydrogen atom nuclei endowed with high energies, a crystal of lithium fluoride was bombarded with a stream of some ten billion of these sub-atomic bullets per second.

In the first test, proton bullets with energies of 360,000 volt-electrons were used. Then the energy of these tiny projectiles was raised to 510,000 volt-electrons, and finally to 710,000 volt-electrons. In each case the number of lithium atoms disintegrating under the bombardment was obtained by counting the helium ions which shot out of the crystal. The number of disintegrating atoms increased as the energy of the proton bullets was increased.

Because of equipment now on hand, Professor Lawrence and his associates believe they are in a position to carry these disintegration experiments to a further point than has yet been possible. The machine now in use is capable of producing protons with energies as high as 1,200,000 volt-electrons. Although this is a higher limit of energy than has ever been officially reported, Professor Lawrence says that he has a larger machine of the same type which will record a still higher limit of energy. This machine, which contains one of the world's largest magnets, is now producing hydrogen molecule ions with an energy of 3,600,000 volt-electrons.

The highest energies previously reported were those obtained in the Department of Terrestrial Magnetism of the Carnegie Institute of Washington. The limit was about 1,000,000 volt-electrons, and the number of protons with this energy was very small. In comparison, the University of California machines produce projectiles at the rate of about ten billion per second, and reach energies well over one million volt-electrons.

With such means available it is believed that it will be possible to blast apart any atom in the table of chemical elements. This will in effect open a new field of physics, and far-reaching discoveries may be anticipated in the future.

A NEW VARIETY OF BEET

"U. S. No. 1" is the name of a sugar-beet—a new variety produced by the plant breeders of the U. S. Department of Agriculture to strike the first heavy blow at the curly-top disease which is a grave menace to the whole western beet-sugar industry and at present actually affects seriously one third of the total acreage planted to sugar-beets.

"U. S. No. 1" has a high degree of resistance to curly-top, and, although it is expected that better varieties will be produced in the future, it is believed that this one is good enough to justify extensive planting. Test plantings have shown the new variety to produce from twelve to eighteen tons an acre, while commercial varieties grown in comparison yielded from seven to fourteen tons. The new beet produced from 4,189 to 6,185 pounds gross sugar an acre and the others from 2,755 to 4,738 pounds.

It is planned to have all the seed of "U. S. No. 1" grown in this country, thus establishing an extensive new American industry, and at the same time enabling the Department of Agriculture to exercise effective supervision over it. In the western beet-sugar areas, seed is distributed by the contracting manufacturers to the farmers who grow the crop, so that the handling of the new variety will be that much easier. No seed is available for general distribution. It is expected that enough seed for the entire acreage now infested with curly-top will be available by 1934.

Curly-top is a disease that causes the leaves of beets to curl up, and hence to lose much of their efficiency as food factories. It is caused by a filtrable virus, one of the class of still-mysterious living things that can pass through the pores of a fine porcelain filter without loss of virulence. The virus is carried by leaf-hopper insects, which live on wild vegetation in canyons near the beet fields during off seasons. While plant breeders have been devising a defense in the form of the disease-resistant new variety, entomologists have been studying plans of attack that will carry the warfare into the enemy's country, to reduce the number of leaf-hoppers that annually invade the beet fields.

THE DIESEL ENGINE

THE installation of the world's largest Diesel engine at Copenhagen is being watched by engineers everywhere because it is the latest and one of the most important events in a possible industrial revolution. Its successful and economical operation will mean the wider use of crude oil as automobile and airplane fuel and as the source of energy for the generation of electricity.

Rudolph Diesel's invention has many advantages to recommend it. Compared with the conventional automobile and airplane power plant, its lack of an ignition system and use of cheap, practically non-inflammable oil instead of gasoline are important.

In Europe, where gasoline is costly, the Diesel engine is already used as the power plant for many trucks and buses, but in America, with gasoline cheaper, its application to the automotive field has not been so rapid. The Cummins Diesel automobile has been one of the foremost

developments in this country. It competed in the racing classic at Indianapolis and finished with reasonable success.

America is also witnessing the development of the Diesel airplane engine which has been largely fostered by the Packard Company. The weight per horsepower has been reduced to a figure comparable with that for gasoline and the advantage of non-inflammability of fuel was unfortunately illustrated by a fatal accident. Captain L. M. Woolson, the Packard engine's designer, was killed in a crash during a fog in his Diesel-powered plane, but the ship did not catch fire. Authorities agreed that, had gasoline been used, the plane would have been immediately consumed by flames.

The Diesel was initially a heavy engine, and its widest application is as a marine and stationary power plant. But research has consistently reduced its weight. Because of the Diesel's small size and lightness compared with steam boilers and turbines, the new German "pocket battleships" are propelled by such engines, which were specially built much lighter than most marine Diesels. Europe has a number of large Diesels in stationary power plants, one of which is a 15,000 brake-horsepower engine in the Hamburg Power Station. Seven thousand horsepower is America's largest, installed at Vernon, California.

Engineers are continually debating the range of usefulness of the Diesel engine and most of them agree that in its present form it can be economically operated as a subordinate source of power under many different conditions.

MAP BY COLUMBUS

A COPY of a map made by Columbus in 1498, the original of which vanished long ago, has been found in a Constantinople museum. It is described by Professor Paul Kahle, of the University of Bonn, in *Forschungen und Fortschritte.*

The copy appears as part of a large world map made by the Turkish geographer and navigator, Piri Re'is, dated March, 1513. The lands of the Old World are derived from other early maps, but when it came to the newly discovered lands across the Atlantic the cartographer depended entirely on Columbus. The islands are located as he described them, and the names on the towns and physiographic features are those used by Columbus. This part of the map, moreover, is specifically ascribed by its maker to "Colonbo," which is a variant by only one letter from his original Italian name, "Colombo," the one-letter shift being due, perhaps, to the Spanish rendition of his name as "Colon."

In an endeavor to account for a copy of Columbus's 1498 map being in the hands of the Turks, who were of course enemies of all Christendom at that time, Professor Kahle has traced in Turkish records the fact that an uncle of Piri Re'is had owned a Spanish slave, captured with some Spanish ships in the western Mediterranean. This Spaniard claimed to have made several voyages with Columbus. Professor Kahle thinks it not improbable that the Turks may have taken a copy of the 1498 map from the captured ship, and that this copy was in turn copied by Piri Re'is on his world map of 1513.

One feature of the Re'is map may throw a little additional light on the still-disputed matter of Columbus's nationality. A small group of islands in the West Indies is designated as "the islands of the eleven virgins"; and the word "eleven" is given in Italian, "undici," not in Spanish, "once."

ITEMS

NEW fossil remains of Peking Man, *Sinanthropus Pekingensis,* have been found at the Chou Kou Tien site where the original skull was discovered in 1929. The new find consists of fossilized small bones from the wrist. They are reported to be definitely human in character.

THE identification of several species of fossil fungi has been reported to the Polish Academy of Letters and Sciences by Madame Wanda Zablocka, of the Janczewski Botanical Laboratory. Fungi are not often preserved as fossils; but these were of the type known as pyrenomycetes, which form hard woody growths on the branches of trees which they infest as parasites. The species identified by Madame Zablocka date from Tertiary geological time, which ended some ten million years ago. They were found in a salt bed.

ONE hundred and ten hospitals in the United States were forced to close their doors during 1931 as a result of the depression, Homer Wickenden, general director of the United Hospital Fund in New York, has reported to the Committee on Welfare and Relief Mobilization of 1932. "If hospitals were forced to lower their medical standards, restrict their x-ray service and their laboratory work, and discharge their nurses and social workers they would probably find that the increased length of stay of the patients, particularly the free patients, would make their financial burdens all the heavier," he pointed out. "The public, not only for its own safety, but in the interest of economy owes it to the voluntary hospitals to see that medical standards are maintained and that scientific progress is promoted in spite of the hard times," he advised.

THE bob-white quail, known to winter hunters as a wild, timid bird, haunts farmyards and appears to like human society in the summer, Arthur C. Bent says in a report issued by the Smithsonian Institution. Among other curious facts about this common bird, Mr. Bent explains why they are believed sometimes to "withhold their scent" thus eluding dogs. The explanation probably is that the rapid passage through the air dissipates most of the scent from the plumage. The birds being frightened, crouch low on the ground with feathers closely pressed against the body, shutting in body odors. And, as they have not run anywhere, there is no foot scent. Under ordinary circumstances, however, the bob-white shows a definite preference for using his feet rather than his wings. Quail do much of their traveling on foot, and they are great travelers. In some sections they are said to make seasonal migrations from one type of country to another, the journeys being made largely on foot. Mr. Bent believes that they prefer to escape their enemies by running, until too hard pressed. A bird dog will often trail a running bevy for a long distance.