

PHYSICS

Superheavy Element 94 Discovered in New Research

Confirmation of Fermi's Nobel Prize Research Begins Discovery of Whole New Group Heavier Than Uranium

DISCOVERY of a whole new group of chemical elements heavier than number 92, uranium, which the textbooks now list as the universe's heaviest, has begun through the positive identification of element 93 and the probable discovery of element 94 at Berkeley, Calif.

The element-adding research, done by Dr. Edwin M. McMillan of the University of California and Dr. Philip Hauge Abelson of the Carnegie Institution of Washington, confirms the discovery made several years ago by Prof. Enrico Fermi, Italian Nobelist now working at Columbia University, of element 93.

When in January, 1939, the sensational splitting of uranium atoms with release of power was discovered, the existence of element 93 was called into question. Dramatically this happened at about the time that Prof. Fermi received the Nobel prize for his researches. Now Prof. Fermi's discovery is vindicated and the discovery at Berkeley of still another superheavy element is indicated.

It is expected that the discovery of element 94 of atomic weight 239 will be reported in an early issue of the *Physical Review*.

Theoretically this new element 94 might be converted by self-destruction or radioactive emission of a helium nucleus into the uranium of atomic weight 235 which is sought as source of atomic power, but, surprisingly, this new element 93 is very stable. There is no likelihood that it can be used in the manufacture of the power-producing uranium.

Here is the train of events in the sub-microscopic world of the atom that gives rise to the new heavy-weight elements:

Starting with the common sort of uranium 92 of 238 atomic weight, this element is bombarded with relatively feeble neutrons of 25-volt energy. One of these is captured by resonance and the ordinary uranium becomes radioactive, with a half-life of 23 minutes. This produces element 93 of atomic weight 239. This is the element discovered by Prof. Fermi.

The new element 93 is itself unstable and is radioactive, half of it disintegrating every 2.3 days. The existence of this

reaction was first noted but not identified last year by Dr. E. Segre, a former colleague of Prof. Fermi's at Rome, working at the University of California.

Now the McMillan-Abelson research indicates that with emission of electrons the element 93 changes to element 94 of atomic weight 239.

Thus two elements heavier than uranium are added to the periodic table of the fundamental building blocks of the matter of the universe.

The discovery of other heavier elements may be expected as research progresses. For example, element 95 is being sought. The relative stability of element 94 among elements that are all radioac-

tive brings hope that the others will be identified.

If the element 94 of 239 atomic weight gave off an alpha particle or helium atomic nucleus of weight 4, it would be converted into the power-emitting uranium 235. But preliminary explorations are understood to have indicated a very long lifetime for element 94, perhaps many thousands of years, making highly improbable any possible production of uranium 235 by this means.

Science News Letter, June 22, 1940

ENGINEERING

Dancing Light Beam Gives More Faithful Sound

SNATCHING from the laboratory a dancing mirror to render more faithful reproductions of phonographically recorded sound, a new sound system for home and commercial phonographs was introduced by David Grimes, chief engineer of the Philco Corporation.

Instead of the conventional needle of the ordinary phonograph, a feather-weight sapphire floats along the groove of the record. The recorded sound is



BIGGEST DINOSAUR FOOTPRINT

That is the claim made for this 54-inch depression in a rock stratum near Glen Rose, Texas, uncovered by a University of Texas paleontological survey, aided by the WPA, Dr. E. H. Sellards directing. When the 50-ton, 80-foot-long Brachiosaurus set his yard-and-a-half foot down here in Cretaceous times, about 130,000,000 years ago, what is now rock was soft seashore mud. Now, three-year-old Tommy Pendley from a nearby farm finds the footprint a nice wading pool.

translated into minute bobbings of a paper-thin aluminized mirror, such as heretofore has been used only in galvanometers and oscillographs of research laboratories.

A tiny beam of light from a specially made lamp plays on the mirror, which reflects it to a small photoelectric cell, creating in the cell an electric current that corresponds to the sound variations on

the record. Amplified and reproduced in a loud speaker, this current gives a high degree of faithfulness with a minimum of scratch.

Since the motion of a needle in the record's groove does not need to bear down heavily to set up mechanical or crystal vibrations, it is claimed that the life of the record is increased at least ten times. Needle changing is eliminated.

Science News Letter, June 22, 1940

NUTRITION

Europe Eats Meat Today Unable to Save for Tomorrow

Large-Scale Slaughter of Food Animals, Including Dairy Cows, Provides Plenty Now But Scarcity Ahead

THE FAMOUS killing of the goose that laid the golden eggs is matched unwillingly in Europe today by large-scale slaughter of food animals—including dairy cows that provide milk, butter and cheese.

Result: Meat on dinner tables in embattled countries today, but perhaps less by the end of 1940. It takes about three years to breed and bring beef cattle to market stage; six months for hogs.

A dairy cow starts giving milk at about two years.

Whether this will actually lead the world into a meat shortage, food economists hesitate to predict. It depends, they say, on the length and course of the war, and how well countries involved can keep the livestock replacements up.

Encouragingly, the world's meat cupboard is far from bare. On the contrary, outbreak of war found world cattle, hogs, and sheep at fairly high level. By latest estimates, the world's dairy and meat cattle totaled about 697,000,000; hogs, 294,000,000; sheep, 634,000,000, all larger totals than averages a few years back.

The champion beef exporter of the world, Argentina, for example, had a 6% larger supply of beef in 1939 than in 1938. England's cattle and sheep were near record high, Germany had 2,000,000 more hogs than in 1938. Small Denmark when invaded by Germany had in the fields the largest number of cattle in her history — 3,258,000. Danish pigs, however, were fewer than in some recent years.

The United States, recovering from bad drought years of 1934 and 1936, has been increasing its livestock, though there

is little likelihood of a tremendous all-time high such as our cattle production reached in 1918. In this war, Europe prefers to buy guns and airplanes from the United States rather than meat and bread.

Killing of meat and dairy animals in countries hard-pressed by war needs is attributed to varied causes: There is shortage of feed for animals. Grazing land provides more food if it can be sowed to grain. Devastation has swept large farming areas.

In Finland, thousands of cattle were slaughtered when Finns evacuated the area given up to Russia. Agriculturists commented tersely: It solved the meat problem, at expense of the future.

Great Britain, warned by her advisers to plan for long war, has actually increased her cattle, in spite of heavy slaughter, according to a sample census taken this spring. Britain's sheep have not yet decreased, and hogs not much.

But the picture of British livestock supplies is regarded as less satisfactory than this summary would indicate, since the reports show that even dairy cattle, which got priority of feed, have often been on short rations and have given less milk.

It is forecast that by next year, England's meat animals will diminish in number, and the United Kingdom will be anxiously purchasing more heavily abroad than now—or eating less meat. Even this year, Britain is buying more beef from South America, more lamb from New Zealand than last year. Canada is supplying large quantities of pork.

Just now it is patriotic to eat pork in England, to consume quantities of this

meat on hand. British refrigeration facilities do not permit storing pork on any such scale as America takes for granted.

Fate of Denmark's fine herds is being watched, by statisticians who follow the "food war." How long Germany expects to fight may be indicated by the recklessness or caution shown toward Danish farm animals. Already, large numbers of Denmark's young pigs and hogs not up to market weight are reported slaughtered.

What has happened to the meat and dairy supplies in Poland, Netherlands, Belgium and north of France cannot yet be summarized.

Admitting that the "fat gap" is the weakest point in her nutrition, Germany has tried determinedly to keep up milk production in the Reich, and to avoid such wholesale killing of stock as she came to in the World War. "Swine murder" some German critics called it, in World War days, when 8,000,000 hogs were killed in a year and when cattle were reduced in 1918 from nearly 22,000,000 to less than 18,000,000.

The food war has caused most misery to unfortunate countries that sought to be neutral and found themselves overrun by invaders. Their lands wrecked by armies, their people driven about as refugees, they are first to face famine danger.

The expanded Reich has apparently loosed the force of the Allied food blockade, by gaining power over supplies in invaded countries, and by gaining laborers, however inexperienced, who can be drafted to work German farms.

England, on the other side, has not found her food shipments from overseas seriously menaced by German submarines and mines. In the main, Allied losses have been more than made up by German cargoes the Allies have seized.

Entrance of Italy into war on the side of Germany struck another blow to the French food supply. For cargoes of food for France had been moving steadily across the Mediterranean from African colonies, not heretofore interfered with by Italy.

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● RADIO

Dr. Waldo G. Leland, director of the American Council of Learned Societies will talk on "International Obligations of American Scholarship" as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, June 27, 4:00 p.m., EDT, 3:00 EST, 2:00 CST, 1:00 MST, 12:00 PST.

Listen in on your local station. Listen in each Thursday.