GENERAL SCIENCE

Nobel Prize Winners

Plutonium and five other elements as well as over 100 isotopes discovered by U. S. Nobelists in Chemistry. Physicists' award is for early atom-smashing work.

See Front Cover

➤ NEVER AGAIN in the history of science will it be possible to discover through their creation a half dozen major chemical elements as well as over 100 isotopes or varieties of other chemical elements.

This is the imposing record of the two scientists of University of California's Radiation Laboratory who have been awarded this year's Nobel Prize for Chemistry.

These two scientists have between them shared in the discovery of elements 93, 94, 95, 96, 97 and 98, the most important of which is plutonium number 94. They are Dr. Glenn T. Seaborg, professor of chemistry, and Dr. Edwin M. McMillan, professor of physics.

Before the dawn of the transuranium era of science for which Drs. Seaborg and McMillan are largely responsible, there were only 92 elements known. The heaviest of them was uranium which is the essential material for atomic bombs because the modern A-bomb's plutonium is made from it.

Shown on the cover of this week's SCIENCE NEWS LETTER are Drs. Seaborg and McMillan. Back of Dr. Seaborg (left) is a periodic table while in front of him is the essential apparatus he uses for separation of new elements. On the right Dr. McMillan is shown at the control panel of the University's 300-million-electron volt synchrotron.

In 1940 Dr. McMillan with P. H. Abelson discovered neptunium, element 93, and then Seaborg with associates carried out extensive researches which resulted, also in 1940, in the discovery of the new element plutonium, element 94.

A year earlier, German experiments had shown that bombardments of uranium with slow neutron atomic particles split the atoms and converted mass into energy. This was the famous fission process of nuclear energy basic to the atomic bomb.

One variety of plutonium, the 239 isotope, was identified as being fissionable like the 235 isotope of uranium. Although only microscopic amounts of this plutonium were created in the University of California 60-inch cyclotron, it became an alternate material to the rare natural isotope of uranium 235 as the material of the projected atomic bomb.

Dr. Seaborg headed an intensive top-secret wartime project to study and produce plutonium, working with a large staff at the Metallurgical Laboratory in Chicago. So successful was the project that although the full scale plutonium effort did not begin until 1942, a plutonium bomb was dropped in actual warfare in 1945.

Dr. Seaborg and his associates discovered two other elements, number 95 or americium, and number 96, curium, during the war period. In postwar research, element 97, berkelium, and element 98, californium, were added to the periodic table, both created in the 60-inch cyclotron.

After his work on neptunium, Dr. McMillan worked on the early stages of radar and sonar devices for the war. But in 1942 he went to Los Alamos to participate in the development of the atomic bomb. Dr. McMillan developed the theory of the synchrotron type of atom smasher which carried on the cyclotron pioneering which won for the University of California's Dr. Ernest O. Lawrence the Nobel prize.

Dr. McMillan's synchrotron principle locks the atomic particles in the atom-smashers in such a way that under electromagnetic influence they are coaxed to higher and higher energies. It is applied to the giant accelerators now being built, some of which will rival nature's cosmic ray power.

This idea of Dr. McMillan's was independently discovered by a Russian physicist, V. Veksler, but since his publication in 1945 no word of any practical use in Russia has come through the iron curtain.

The Radiation Laboratory at Berkeley is still producing results, but many of them are being accumulated in secret files deemed to be of prime military importance.


NOBEL PHYSICISTS—Dr. Ernest T. S. Walton (left) of Dublin's Trinity College and Sir John D. Cockcroft (right), director of Britain's atomic energy establishment, share the Nobel Prize for Physics for their pioneering work in atom-smashing.

Transmutation of Atoms

Atomic transmutations, commonplace now, had their beginnings more than a decade before the first atom bomb was set off. Key roles in this early work which ushered in the Atomic Age were played by the two British scientists who share the 1951 Nobel Prize for Physics.

They are Sir John D. Cockcroft, since 1946 director of England's Atomic Energy Establishment, and Dr. Ernest T. S. Walton, now at Trinity College, Dublin, Ireland.

In 1932, these two collaborated, at Cambridge University's famous Cavendish Laboratory, in producing the first successful high-voltage atom-smashing machine. Their feat was the more remarkable because of the relatively low voltage used, about 600,000 volts compared to billion-volt ranges now used.

With this 600,000-volt potential, they shot swiftly moving protons, hearts of the hydrogen atom, at a lithium target. A lithium atom that was struck by a fast proton, captured the hydrogen particle, then split into two alpha particles, which are the hearts of helium atoms. A large amount of mass was thus transformed into energy, and on a much more vast scale, this is what happens when an atomic bomb explodes.

The energy given off by the capture-and-splitting process was several hundred times as much as that possessed by the proton whose smashing brought about the reaction. But still, for every atom disintegrated, several millions of particles were required.

When boron was attacked by a stream of protons, some 25 times the number of helium atomic hearts were found as when lithium was bombarded. The same technique was used that the two scientists had successfully applied to transmuting lithium into helium with release of energy.

Also by bombardment with hydrogen, fluorine was broken up into oxygen and helium, and beryllium was changed into lithium and helium.

Science News Letter, November 24, 1951

INVENTION

Water-Tight Case Makes Any Camera Usable Under Water

➤ ORDINARY CAMERAS for still and motion pictures can be used under water with a fluid-tight and gas-tight case which has been awarded a patent. Being gas-tight, it can be used in scientific work in atmospheres containing gases that would be injurious to the photographic film if they got inside the camera.

The case is made of material resistant to corrosion by water or gases, and has openings through which the focusing scales of the camera may be viewed and through which pictures may be taken. Patent 2,573,885 was awarded on this invention to Dudley A. Whitman, Miami Beach, and William F. Whitman, Dade, Fla.

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MEDICINE

Ulcer Personalities

➤ THE "ULCER PERSONALITY" may be the result rather than the cause of stomach ulcers, Dr. T. D. Kellock of Central Middlesex Hospital in London believes.

His opinion, which is contrary to that of most modern doctors who have studied the problem, is based on a study of 250 men with ulcer of the duodenum. This is the upper part of the small intestine close to its junction with the stomach and is very commonly the place attacked by ulcer.

The ulcer personality is usually considered that of a hard-working, energetic, successful person who unconsciously is dependent emotionally and wants to be taken care of.

Since personality is formed during childhood, the man or woman who develops an ulcer personality must have had a different childhood from persons who do not get ulcers, Dr. Kellock reasoned. So he investigated the childhood situation of the 250 ulcer patients and compared that with the childhood situation of 164 patients suffering from other diseases.

He found no difference between the two groups in the size, composition or social class of the family into which they were born, in their educational standard at school or in illness in childhood. There did not seem to be any more or less cases of broken homes, with and without stepparents, among the ulcer patients than among the non-ulcer patients.

It may be that other childhood features might have been different between the two groups, Dr. Kellock states. Or factors operating in late teens or early twenties may be responsible for the characteristics said to be shown by ulcer patients.

"However," he states, "unless further investigations show some clear-cut differences between duodenal ulcer patients and the general population regarding factors operating before the appearance of symptoms, the possibility that the ulcer personality may be the effect rather than the cause of the disease must be considered."

Dr. Kellock's findings are reported in detail in the BRITISH MEDICAL JOURNAL (Nov. 10).

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Question Box

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