PHYSICS—MEDICINE

Artificial Radioelements for Medicine

Discoverers of Artificial Radioactivity Now Hint At New Substance That Can be Introduced Into Body

NOTE: The articles on this and the following page were received by cable from the Science Service correspondent at the International Conference of Physics in London.

ARTIFICIAL production of radioactive elements useful in medicine and superior in intensity to radium was predicted by the famous husband-and-wife scientific team, Prof. F. Joliot and Irene Curie of Paris, who discovered artificial radioactivity less than a year ago.

Speaking before the International Conference of Physics, at London, the Joliots expressed their hope of producing superior radioactive elements with useful properties not possessed by the radioactive substances in the development of which the famous parents of Mme. Joliot played such an important part.

These powerful radioelements that the Joliots foresee when introduced into the living body must, they declared, behave very differently because of their chemical properties and the fact that they will disintegrate without leaving a radioactive residue.

This has great possibilities in medicine. It may mean a new kind of cancer treatment in which artificial radioactive substances produced cheaply can be introduced directly into the cancerous tissue to do their work, and then become harmless.

"Internal Materialization"

The Joliots speculated upon just what happens within the central portion of the atom when it becomes artificially radioactive. They attributed the emission of electrons and positrons to what they called an "internal materialization" of gamma radiation, radiation of the same kind as light and X-rays. The gamma radiation, they suggest, is transformed into a positive and a negative electron in the process of leaving the central portion or nucleus of the atom which gave rise to it. In this manner neutron radiation and gamma radiation are emitted when beryllium is bombarded with the cores of helium atoms, called alpha particles, which are shot off from the naturally radioactive substance polonium.

But the Joliots found it difficult to imagine what happens within the atom's heart when neutrons are the bombarding particles. A possible interpretation is that the entrance of a neutron is followed by an expulsion of a negative proton, a particle that has not yet been discovered.

This expulsion of a negative proton might explain the formation of a substance heavier than any hitherto known, chemical element 93. Such an element has been reported by Prof. Enrico Fermi of Italy but doubt has been cast upon its actual existence.

Certain experiments, the Joliots reported, suggest that neutrons bombarding phosphorus could produce radioelements themselves emitting protons.

Natural radioelements, like radium and uranium, are pronounced by the Joliots to be apparently rare survivors of numerous elements which existed under conditions of temperature, pressure and radiation different from those existing now on earth. This must have been millions of years ago.

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PHYSICS

Study Region Where Atoms Unite to Determine Forms

PROBING into the region of the extremely minute, where atoms come together to determine the character of larger aggregations of matter, world-famous physicists attending the joint conference of the International Union of Pure and Applied Physics and the Physical Society heard Sir William Bragg keynote the inquiry:

"We must look into the region of crystals composed of atoms for explanation of the quality of a steel or bronze, a glass, a textile fiber, a living nerve and other substances. And somewhere there enters the breath of life to control atomic composition which enters into living mechanisms."

All investigations of solid bodies of every form, whether animal, vegetable or mineral, have as their primary aim, Sir William said, the connection between the properties of the body on one hand and its composition and architecture on the other hand.

Some of these properties are directly dependent, he explained, on the few atoms and crystals of the unit cell. The arrangement of the unit cells determines the behavior of the body as a whole. Some other properties depend on the action of atomic forces in groups of hundreds, thousands or even tens of thousands of atoms.

Dr. R. A. Millikan, American physicist, presiding at the discussions upon solids, remarked that most of the knowledge of the subject has been gained by pure empiricism.

"Only in the last two or three years," Dr. Millikan said, "had the mind of man been able to get inside this body of knowledge in a theoretically satisfactory way."

It is pleasant, Sir William told the physicists, that a crystal responds to every effort to improve the accuracy of the measurements that scientists make upon it.

He called attention to the distinction made by Prof. Adolf Smekkal of Halle, Germany, between "insensitive" effects which are functions of the composition of the crystal itself and the "sensitive" effects which depend upon the crystal's treatment and previous history.

Large discrepancies have appeared in the investigations upon solids and the physicists are searching for the cause. For example, the cohesive force of rock salt calculated from the knowledge of its structure and its ionic composition is about 200 kilograms per millimeter, whereas the experimental value is usually less than a single kilogram per millimeter.

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PHYSICS

Tweedledee, Tweedledum—But One Lives Longer

THE strange fact that two varieties of a radioactive element, exactly the same in mass and in charge, have very different periods of life excited discussion at the International Conference on Physics.

One of the newly discovered artificial radioactive elements, the mass thirteen isotope of nitrogen, has different peri-