

PHYSICS

# Man-Made Radioactivity Achieved at Pasadena

## Using No Natural Radioactive Materials, Americans Follow French Experiments and Get More Lasting Disintegration

**A**LL THE newly discovered particles of physics—deuteron, positron and neutron—cooperate in one grand experiment to produce a new case of the remarkable artificial radioactivity discovered in Paris a few weeks ago. (*SNL*—Feb. 10, '34, p. 83; Mar. 3, p. 133.)

It was found at the California Institute of Technology, Pasadena, that when deuterons, which are heavy hydrogen nuclei, are driven at carbon atoms by a high voltage tube, positive electrons are produced in great numbers. It is known that neutrons are also formed. But in this case they are not the center of interest. The positive electrons attract more attention because they continue to shoot out from the carbon for many minutes after the deuteron bombardment is stopped. Their number drops fifty per cent. every ten minutes.

These experiments were performed by Prof. C. C. Lauritsen and two graduate students, R. Crane and W. Harper. Definite results were first obtained on Monday, Feb. 26. They took a hint from the French husband-wife research team, M. F. Joliot and Mme. Irene Curie-Joliot, who first found that boron bombarded with radioactive alpha rays continued to give off positive electrons of the same duration as in the Pasadena experiments. Evidently, the same products are formed in the two cases.

The American method is especially significant in view of the fact that no natural radioactive materials are required. All the energy is generated by man-made apparatus. Nevertheless, the number of positive electrons is hundreds of times greater than in the French experiments. Other substances are being investigated for similar effects and other products of the activity are being searched for.

There is no way of telling what the practical applications of the new effect will be but they will probably be important. The theoretical consequences are of the utmost significance. Entirely new elements may be formed and studied to give information which could never

be obtained from the materials which nature provides.

Artificial radioactivity that lasts for a longer period than ever before achieved has resulted from a stream of million volt particles launched against targets of light elements in more recent experiments at the California Institute of Technology.

The same scientists, Prof. Lauritsen and Messrs. Crane and Harper who had previously found that artificial radioactivity persisted over an hour after bombardment of carbon by deuterons, or heavy hydrogen hearts, have tried bombardment of boron with the result that the activity was found to last even longer. The stream of million volt particles consisted of alpha particles, protons and deuterons, but probably the deuterons were the effective projectiles.

The resulting activity from boron was less at first than that from carbon but it lasted much longer. Instead of dropping to half in ten minutes, the boron product took twenty minutes to fall to half value.

Presumably the sequence of events in the case of carbon is as follows: The deuteron enters a carbon nucleus and kicks out a neutron. This act transforms the carbon into a peculiar form of nitrogen, which has a mass of thirteen instead of fourteen or fifteen. The freak nitrogen cannot live long because it has

an excess of positive charge. Spontaneously it ejects a positive electron and thereby turns into carbon again.

The positive electrons have been seen in a Wilson cloud chamber and have been counted in various electrical devices. Their energy runs up to more than half a million volts. This they spend in breaking up atoms in their path. The broken atoms or ions give the clues by which the positrons are detected. When their energy is nearly spent negative electrons seek out the positives and join with them. The positive cancels the negative and the energy goes off as a pair of photons. Prof. Lauritsen and Mr. Crane have observed these photons and found that they disappear at just the same (*Turn page*)

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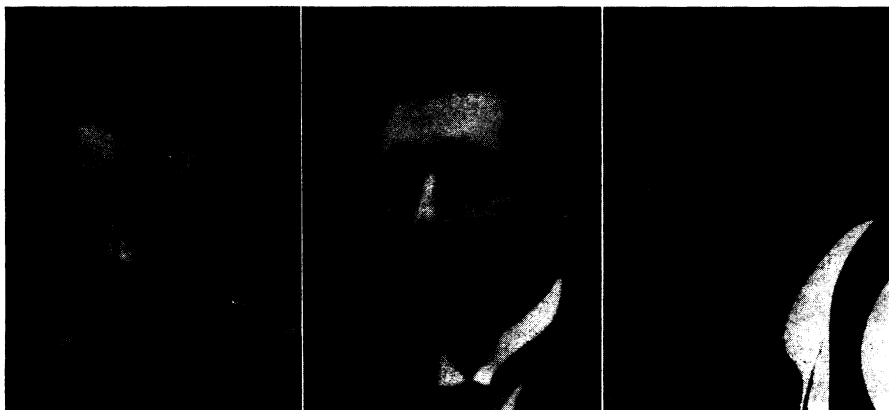
## Injections Lengthen Life Of Tuberculous Rabbits

**R**ABBITS suffering from experimental tuberculosis live much longer when doses of an iron salt, ferric chloride, are injected into their veins, Dr. Vally Menkin of Harvard Medical School has found.

In a report to *Science*, Dr. Menkin states that whereas animals without the iron salt treatment lived, on an average, 81.4 days after infection with tuberculosis, the average life span of the animals treated with the iron salt was 198 days, up to the time when two survivors of this latter group were sacrificed for examination.

Hope for a specific method of successful treatment for human tuberculous patients is, of course, aroused by reports of the investigation, but it is far too early to apply these results with laboratory animals to human beings.

*Science News Letter, March 10, 1934*



INDUCERS OF RADIOACTIVITY

Left to right—Mme. Irene Curie-Joliot, F. Joliot and Dr. C. C. Lauritsen.