

## PHYSICS

# New Atomic Material

Hint at possibility of using uranium 238, considered nonfissionable, as source for nuclear energy. It releases three to five neutrons when bombarded with relatively heavy atoms.

► A NEW possibility has arisen of obtaining nuclear energy directly from supposedly nonfissionable uranium that composes 99.3% of the earth's supply of this element.

The same scientific announcement that revealed the manufacture of the latest and heaviest chemical element, No. 99, tells how relatively heavy atoms of nitrogen and carbon can be used to bombard uranium isotope 238, with the release of three to five neutrons.

This is the important new discovery that may, somehow, indicate the possibility of a new atomic energy reaction, possibly even a new kind of atomic bomb. The A-bomb reaction operates by fission that releases one and a half neutrons per fission. That is necessary and sufficient to keep the chain reaction going, explosively or more peacefully in an atomic reactor.

Heretofore no use for uranium 238 has been known except to convert it to plutonium. Plutonium 239 shares with uranium 235, the rare unstable isotope, ability to fission spontaneously whenever a neutron is encountered. These are the atomic fuels that are now practical.

Heavy particles like nitrogen and carbon, used in the cyclotron in place of hydrogen and helium as bombarding particles, give rise to many neutrons, it appears from the scientific papers reporting the process in *Physical Review* (Jan. 1).

At the same time, the new elements resulting from the nuclear reactions are six and seven steps up the scale of transuranium elements. When the bombarding particle is nitrogen, this produces the new man-made element 99. This latest element has not been produced by a small step from californium, element 98. (See SNL, Feb. 13, p. 103.)

An air of mystery hangs about the discovery of the new man-made chemical element 99. Coupled with the fact that a fundamental law of cyclotron operation discovered in this country remains unpublished, while the same law has appeared in two British scientific journals, *Proceedings of the Physical Society* and *Nature*, as the independent discovery of scientists at the University of Birmingham, the wisdom of secrecy in scientific matters must again be questioned.

In the article announcing element 99 a footnote states:

"There is unpublished information relevant to element 99 at the University of California, Argonne National Laboratory, and Los Alamos Scientific Laboratory. Until this information is published the question of the first preparation should not be prejudged on the basis of this paper."

Two departments of the University of California contribute complementary papers to the current *Physical Review*. The general law of cyclotron tuning, used for producing the new element 99 in one operation by adding nitrogen to uranium 238, in the 60-inch cyclotron of the Crocker Laboratory is announced by Drs. G. Bernard Rossi, William B. Jones, Jack M. Hollander and Joseph G. Hamilton of the Crocker Laboratory, the Radiation Laboratory and the Division of Medical Physics.

According to this law, much heavier ions than the hydrogen and helium ones originally used to bombard uranium can now be used in the cyclotron.

Carbon, which is 12 times as heavy as hydrogen, and nitrogen, which is 14 times as heavy, can be kept in motion by the cyclotron's magnetic field when it is tuned to a resonance that is one-third the natural vibration period of the heavier particles. Other heavy particles that have been tried

out in the cyclotron include beryllium, oxygen and neon.

Announcement of this fundamental law for operating the cyclotron by principles analogous to the well-known harmonic vibrations in music is stated in the *Physical Review* article to have been reported previously. However, the reference cited by the authors of the paper is to an unclassified report issued in 1951 by the California Radiation Laboratory, but still unpublished. This is the law reported independently by a group operating a 60-inch cyclotron at the University of Birmingham in England.

Must American scientists turn to British sources to learn what has been accomplished but kept secret in their own country?

The second paper first announces the transmutation products of uranium 238, including two isotopes of element 99. This paper is by Albert Ghiorso, G. Bernard Rossi, Bernard G. Harvey and Stanley G. Thompson of the Radiation Laboratory and the Department of Chemistry, University of California.

It may be the emission of neutrons in quantity is keeping these researches secret. This would be like keeping secret the recipe for making match heads for the production of fire. It will not keep fires from being started. It will only give commercial advantage to those who do not see any value in always doing things the hard way.

Science News Letter, February 20, 1954

## AERONAUTICS

# Convertible Airplanes

► CONVERTIBLE AIRPLANES may prove to be useful military tools, but they are not expected to revolutionize the mode of everyday travel, the Aircraft Industries Association has said.

Helicopters already are doing well on short inter-city hauls. Regular airliners are performing satisfactorily on the long-distance runs. Convertiplanes seem un-

likely to improve on either of these commercial services.

However, the hybrid planes, which are the aeronautical engineer's cross between a helicopter and its fixed-wing cousin, are expected to be highly useful in military reconnaissance.

They can take off vertically and fly at fast forward speeds toward the enemy.



**FIRST MILITARY CONVERTIPLANE**—Known as the XV-1, this odd-looking craft, cross between an airplane and a helicopter, is called a convertiplane. The rotor is for vertical flight, the propeller for forward flight.

They can hover while observations are made of enemy gun emplacements and tank movements, and while photographs are taken. They can dart away at a moment's notice when danger threatens.

Convertiplanes, such as the XV-1 just announced by the Air Force's Air Research and Development Command and the McDonnell Aircraft Corporation, are designed to bridge the gap between the conventional plane and the helicopter.

The helicopter can take off vertically, hover, squeeze in and out of tight quarters in rough areas and land in areas impossible for regular planes. Helicopters cannot carry a heavy payload economically. Their forward flight speed is low, their ceiling is limited and their controls are complex.

Fixed-wing planes have these advantages: high speed, high load-carrying capacity, high rate of climb, high operational ceiling, simple controls and fuel economy. Disadvantages are high-speed takeoffs and landings requiring long smooth runways, flat descent angle and poor slow-speed control.

The McDonnell design embodies a helicopter rotor on the XV-1's top, plus a pusher propeller behind its stubby wings. It is designed to carry three passengers, or two litter patients and a medical attendant, in addition to the pilot.

#### MEDICINE

## Urge New TB Treatment

► A COMBINATION of a relatively new gout medicine, probenecid, and PAS, short for para-aminosalicylic acid, should be tried as treatment for tuberculosis, Drs. David T. Carr and Alfred G. Karlson of the Mayo Clinic, Rochester, Minn., advise.

They base their advice on the good results in tuberculous guinea pigs treated with the combination of these two recently developed drugs.

Probenecid, known also by its trade name of Benemid, has previously been suggested as a good team-mate for PAS already used in treatment of tuberculosis. Tests on a small number of patients showed it stepped up the concentration of PAS in the blood of the patients two to four times.

This finding was announced by Dr. William P. Boger of Sharp and Dohme, Benemid manufacturer, and Dr. Forrest W. Pitts of the Philadelphia General Hospital. (See SNL, June 23, 1951, and Aug. 12, 1950, p. 100).

Further studies by Drs. Carr and Karlson and E. V. Bridge at the Mayo Clinic showed that blood serum after PAS and probenecid had been given had greater ability to check tuberculosis germs in the test tube.

In spite of this, Drs. Carr and Karlson point out in their latest report, there have been no reports of studies on patients comparing the anti-TB effects of PAS alone and with probenecid. Since such studies would be difficult to make on patients, the Mayo Clinic doctors used guinea pigs to make their tests.

The XV-1 is the first military aircraft of its kind ever developed. Its helicopter rotor is powered by jets on the tips of the blades.

Although no flight tests have been made on the plane, performance tests on the ground are getting under way. The first XV-1 flight is scheduled for sometime this coming summer.

Other designs proposed in the past include such things as a regular type airplane propeller on the end of a helicopter rotor. The propeller swivels to pull the rotor around during takeoff. In the sky, the rotor is locked and the propeller on its end straightens out to pull the plane forward in fast flight.

Another design consists of two large helicopter rotors on the end of a fixed wing. The whole motor assemblies rotate 90 degrees to change the rotors from the "lifting" to "forward-flight" positions.

A third design was envisioned by an engineer who believed a plane could take off with its nose pointed straight into the sky, then pitch forward into normal flying position. Other engineers feared the craft's speed would be insufficient to permit the fixed wings to assume the plane's load when the time came.

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## ● RADIO

Saturday, Feb. 27, 1954, 3:15-3:30 p.m. EST  
 "Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.  
 Dr. Merrill Moore, psychiatrist and poet of Boston, Mass., will discuss "The Science of the Sonnet."

The National Science Foundation has made 100 grants totaling about \$1,045,000 for scientific research, conferences, education and information exchange this year.

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