

## ASTRONOMY

# Stars Make All Elements

**Mechanism proposed for creating the heavy elements in stellar interiors by thermonuclear-type reactions occurring on a very fast time scale.**

► ALL KNOWN ELEMENTS of which matter is composed, including those man-made in the laboratory, can be built up in the hot interior of stars.

Hydrogen bomb-type reactions occurring in less than a second can account for abundances of heavy elements, Dr. A. G. W. Cameron, Atomic Energy of Canada, Ltd., told the American Astronomical Society meeting in Berkeley, Calif.

Previous theories of element-building have explained the known amounts of the light elements, but have run into difficulty on the heavy elements.

Many heavy elements can be formed only on such a fast time scale, Dr. Cameron said. Of particular interest, he pointed out, is formation of californium 254, an element first made by man in 1950. Californium 254 is heavier than uranium and, like uranium, spontaneously breaks up, or decays, half of any given amount disappearing in 55 days.

This same period of 55 days is observed in the light curves of supernovas, stars that come to a spectacular end by exploding.

That californium 254 may be built in supernovas was shown by production of this element in the H-bomb test at Bikini in November 1952, Dr. William A. Fowler of California Institute of Technology, Pasadena, reported.

Dr. Fowler also suggested that two kinds of uranium, the fissionable kind of atomic bomb fame and the much more plentiful isotope, were formed in equal abundance in the Milky Way galaxy before the earth was formed, instead of in the present ratio of only one atom of uranium 235 for every 140 atoms of uranium 238.

Using the known decay rates of the two uraniums, Dr. Fowler calculated that element formation started at least seven and a half billion years ago. This figure is about two and one-half billion years above the currently estimated value for the age of the universe.

Detection of the free neutrino and new measurements on the neutron's lifetime are among the recent nuclear experiments having a bearing on element synthesis by stars.

The studies reported by Drs. Cameron and Fowler are part of a broad-scale attack on the problems of the origin of the elements and of stellar reactions being made cooperatively by several scientists, including Prof. Fred Hoyle of St. John's College, Cambridge, England, now working in Pasadena; Drs. G. R. Burbidge and Mrs. E. M. Burbidge of Mt. Wilson and Palomar Observatories, Pasadena, Calif.; Dr. R. F. Christy of California Institute of Tech-

nology, Pasadena; Dr. Jesse L. Greenstein, Mt. Wilson and Palomar Observatories; Dr. Martin Schwarzschild, Princeton University; Dr. Harold C. Urey of the University of Chicago and Dr. Hans E. Suess of the U. S. Geological Survey.

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## BIOPHYSICS

## Make Radioactive Relaxing Drug

► A RADIOACTIVE RELAXING DRUG has now been created. The drug, perhaps to be known as radioreserpine, was made by growing the Rauwolfia plant in an atmosphere containing radioactive carbon dioxide.

Rauwolfia, also known as the snakeroot plant, is the source of reserpine, relaxing drug used to reduce high blood pressure and to calm mental patients. It has been used medically in India for centuries.

The radioactive reserpine, destined for tracer studies of the drug's path through the body to be made at Columbia Uni-

versity, New York, was produced at Argonne National Laboratory, Lemont, Ill., by a research team consisting of Edwin A. Peets and Dr. Arthur Schuler of Columbia University's Lamont Geological Observatory and Dr. John Skok and William Chorney of Argonne National Laboratory.

Science News Letter, September 8, 1956

## PHYSICS

## Model Satellite and Its Radio Displayed

See Front Cover

► A MODEL of the polished metal spheres, which will soon be circling the earth as earth satellites during the International Geophysical Year, is shown in the photograph on the cover of this week's SCIENCE NEWS LETTER.

Holding the prototype, with its message-sending antennae, is Miss Doris Perl, research assistant in the exhibit division of the U. S. Information Agency. The sphere was made at Naval Research Laboratory, Washington, for display at the International Trade Fair in Berlin from Sept. 15 through Oct. 30.

The 20-inch model is said to be a full-scale representation of the actual satellite's exterior. The moonlet will be stuffed full of instrumentation, the final design of which is not settled, although one model of the Minitrack radio system to be used for locating the satellite will also be on display.

Science News Letter, September 8, 1956



**MINIATURE RADIO FOR SATELLITE**—Shown here reflected in a model of the sphere in which it was designed to be installed is one possible layout for the miniature radio transmitter that will help to locate the earth satellites when they are launched during the International Geophysical Year.