

NUCLEAR PHYSICS

Atomic Bomb Speculation

Is serious work being done to convert hydrogen into helium and release sun-like atomic energy? Process may be possible only at temperatures of sun.

► AMERICA'S atomic scientists are just not talking at all, but the publication in the *Infantry Journal* (Jan.) of a hint by former Assistant Secretary of War John J. McCloy that we were working on a new kind of atomic bomb has started a new wave of speculation.

The big question is: Is serious work being done here on earth to try to duplicate the conversion of hydrogen into helium with release of atomic energy which keeps the sun stoked?

Going to the famous Smyth report, the atomic energy bible, anyone can read that this sun energy theory was advanced by Prof. Hans Bethe, now professor at Cornell and one of those who worked on the atomic bomb. The heat of the sun is explained by a cycle of nuclear changes involving carbon, hydrogen, nitrogen and oxygen, leading eventually to the formation of helium. This theory is, the Smyth report says, "generally accepted."

Since hydrogen, the lightest element, is very abundant, and uranium and thorium, now the raw materials for atomic bombs, are very rare, so much so as to be controllable internationally, any practical success at duplicating on earth what presumably happens in the sun would have extraordinary results scientifically and politically.

The best guesses have been that the carbon-stove reaction, as the Bethe suggestion is also called, won't work except at the immense temperatures of the sun. Unless such temperatures are created in the conventional plutonium atomic bomb itself, sun temperatures don't exist on earth.

It may be a fair speculation that an atomic bomb such as already used might provide the conditions to start the intricate and involved conversion of hydrogen into helium and positrons with release of energy. This is, of course, mere speculation.

This is the way the Bethe cycle is believed to work:

An ordinary carbon atom atomic weight 12 picks up a hydrogen atom of mass one and becomes nitrogen 13, which shoots off a positive electron or positron to become carbon 13, which in turn takes up a hydrogen atom becom-

ing nitrogen 14. This atom adds a hydrogen atom to become an unusual oxygen 15, which expels a positron, which changes it into nitrogen 15. This heavy-weight nitrogen joins with another hydrogen atom to make the same kind of carbon atom that began the cycle, plus a helium atom of an ordinary sort.

The total effect is the use of four hydrogen atoms to make a helium atom, two positrons and a release of about 30,000,000 electron volts of energy. Chemists have long known that four hydrogen atoms have a slight excess of mass compared with the helium atom of atomic mass 4, and it is this excess of mass that is turned into energy according to the famous Einstein mass-energy equation.

Science News Letter, January 18, 1947

RADIO

Models Used to Plan Radio Antennas

► MODEL ANTENNAS in Ohio State University laboratories made possible the testing of radio antennas for the Army's B-29 bombers before the first of the huge

planes came off the assembly line, reports of wartime study disclose.

Ranging from one-tenth to one-fortieth the actual size of the antennas, the models are covered with copper sheeting or a metallic coating sprayed on a wooden form. First used to test aircraft antennas, they have since aided investigation of radio problems on ships and ground vehicles.

Testing with the models is done at frequencies in the range of 50 and 10,000 megacycles. The model is rotated in an extremely high frequency radio beam to determine the radio wave pattern. The model contains a receiver and variations in strength of the signal are automatically recorded by a device which traces the antenna pattern.

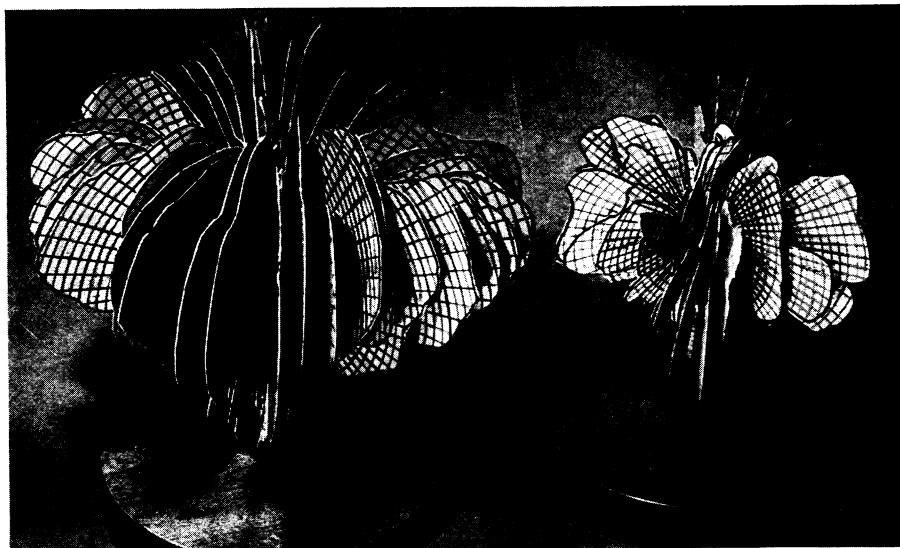
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ENTOMOLOGY

Ants Choose Altitude They Prefer for Homes

► ANTS, like men, have their own preferences in the matter of living-places. Some like it high; some like it low. A study of ants of the mountains of Colorado, reported by Dr. Robert E. Gregg of the University of Colorado, showed that 20 species were seldom found above the grassy basal plains, 24 inhabited only the forested slopes, and two hardy ant species lived only on the desolate, tundra-like upper levels.

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ANTENNA PATTERNS—These cardboard models of radio wave-patterns of antennas were built at Ohio State University. Directions of energy radiation are indicated by the radial distance from the center of the cluster to the edges of the pattern elements.