PHYSICS

Blast Due to Antimatter?

➤ A CHUNK of antimatter smashing into earth's high atmosphere may have caused the huge explosion over Siberia in 1908.

A suggestion that this theory should receive further investigation was made in Nature 206:861, 1965, by three U. S. scientists, including Dr. Willard F. Libby, Nobel Prize winner of the University of California, Los Angeles.

Dr. Clyde Cowan of Catholic University of America, a co-discoverer of the neutrino, and Dr. C. R. Atluri, also of the University of California, Los Angeles, are the two other scientists suggesting the possibility of antimatter content for the Tunguska meteorite of 1908.

The theory is supported by evidence of an increase in the amount of radiocarbon 14 formed in tree rings during 1909, the year following the Siberian explosion.

"Although there are uncertainties in both the estimate of the expected radiocarbon yield on the basis of the antimatter hypothesis for the Tunguska meteor and in any extra radiocarbon burden (content) of the atmosphere in the years following 1908 as reflected in this work, the data do yield a positive result.

"They appear to set an upper limit of one-seventh for the fraction of the meteorite's energy which could have been due to antimatter," the three scientists concluded.

The tree rings examined were from a 300-year-old Douglas fir that fell about 30 miles from Tucson, Ariz., and an oak tree cut near Los Angeles.

The most commonly accepted theory to account for the devastation of the Tunguska meteorite is that it resulted from the collision of a comet head with earth's atmosphere. This would account for the lack of a crater.

However, all theories previously proposed do not account fully for all phenomenon observed at the time of the explosion.

If the antimatter theory proves to be true, it would be the first evidence of antimatter in observable form in the universe.

The Siberian blast has been estimated to have occurred about three miles above ground with a force of 30 megatons. If it had occurred in the United States over Chicago, visible phenomena would have been noticed as far away as Pittsburgh, Nashville and Kansas City, Mo. Thunder would have been heard in Washington, D. C., Atlanta and Tulsa, Okla.

There are no reports from the Tunguska blast of a mushroom cloud, the usual aftermath of a high-yield explosion.

After the fall, however, the nights were exceptionally bright everywhere in Europe and Western Siberia. The brightness slowly disappeared during the next two months.

• Science News Letter, 87:382 June 12, 1965

GEOLOGY

1965 Mississippi Floods Greatest on Record

➤ THE ROLLING Mississippi flood waters this spring have been the greatest on record, according to statistical confirmation by the U.S. Geological Survey.

At St. Paul, for example, from April 12 to 21, more than 800 billion gallons of water were discharged by the Mississippi and Minnesota Rivers, enough to supply the needs of two cities the size of New York for about a year. During this period, about 340,000 tons of sediment were rolled past St. Paul.

A flood of this magnitude is calculated to occur only once in a hundred years, said David B. Anderson of the Survey's office in St. Paul.

The Mississippi River, largest in the United States, drains enormous quantities of water from 1,243,700 square miles of land. It is joined by the Missouri, Ohio, Tennessee and other major rivers and becomes the fourth largest river discharge system in the world, dumping about 620,000 cubic feet of water per second into the Gulf of Mexico. In an average year, this river discharges about 130 cubic miles of water into the Gulf—an amount about one-third more than the volume of water in Lake Erie.

• Science News Letter, 87:382 June 12, 1965

GEOPHYSICS

Controlled Explosions To Probe Earth's Crust

➤ A SERIES of controlled chemical explosions were set off May 3 to continue through July 4 this year to learn more about what lies under the surface of our earth.

From various spots of the Colorado Rocky Mountains to the southeast Coastal Plains, charges of chemical explosives ranging in size from a few hundred to as much as 20,000 pounds are being detonated in drill holes and bodies of water, said Dr. John J. Healy of the U.S. Geological Survey.

This series of explosions represents the fifth phase of a study to determine "profiles" of the thickness and characteristics of the earth's crust and upper mantle. By studying the speeds and kinds of vibrations set off by the explosions, geologists can determine the structure of underlying earth.

The earth's crust ranges in thickness from about 10 miles in the Central Valley of California to nearly 33 miles in the southern Rocky Mountains of Colorado. The mantle extends downward from the bottom of the crust about 1,800 miles to the earth's molten outer core.

• Science News Letter, 87:382 June 12, 1965

TECHNOLOGY

Atomic Clock Has Use In Rocket Navigation

➤ AN ATOMIC CLOCK could determine the position of a rocket to within three-fourths of an inch on a 238,000-mile trip to the moon.

The clock, called the Varian R-20 Rubidium Frequency Standard, will also let airline pilots know their relative and changing positions down to inches, thereby helping to prevent mid-air collisions.

Within a small aluminum container in the instrument an atomized vapor of the element rubidium is excited electronically. The rubidium responds by producing a reference signal so stable that scientists measure it in parts per hundred billion.

Built by Varian Associates, Palo Alto, the instrument weighs less than 20 pounds and is only slightly larger than a shoe box.

• Science News Letter, 87:382 June 12, 1965