

PHYSICS-ASTRONOMY

Exploded Star Too Distant to Check Cosmic Ray Origin

SCIENTISTS studying cosmic rays are diligently watching for a possible increase in the intensity of radiation coming from the constellation of Virgo where Dr. Edwin Hubble and his assistant, Glenn Moore, have discovered a giant super-nova, or exploding star.

Prof. Fritz Zwicky, of California Institute of Technology, and Dr. Walter Baade, of Mount Wilson Observatory, suggested two years ago that such star eruptions might well be the origin of cosmic rays. Scientists have been waiting, ever since, for the discovery of a new super-nova so that any possible increase in cosmic radiation intensity from the direction of the star might be noted.

At the California Institute of Technology the experimental program to test the Zwicky-Baade suggestion is going forward but the hope of proving or disproving the hypothesis with the present super-nova is none too good.

In a statement to Science Service, Prof. Zwicky explains why. He says:

Relatively Small

"The present super-nova is a relatively small object, as super-novae go. Its distance (6,000,000 light years) is extremely great. It comes, in our latitude, only within 45 degrees of the zenith. That means it passes overhead somewhat north of the equator where the magnetic field of the earth greatly reduces all directional cosmic ray effects."

The latest super-nova, however, Prof. Zwicky points out, has already fulfilled some of the two-year-old predictions contained in the Zwicky-Baade paper.

One prediction was that the rate of expansion of the exploding super-nova stars should be much higher than the 1,500 kilometers per second common to such ordinary nova stars as Nova Persei and Nova Aquilae.

"The present super-nova," states Prof. Zwicky, "indeed shows a speed of expansion equal to about 6,500 kilometers a second, in very close accordance with our quantitative predictions."

Another prediction of Dr. Baade and Prof. Zwicky was that in every galaxy on the average one super-nova or exploding star should appear every 1,000 years.

"Observers at the Mount Wilson Observatory and at the California Institute of Technology," states Prof. Zwicky, "have watched constantly about 500 galaxies in the Virgo cluster over a period of two years, starting March, 1934, until now. One super-nova was found in this period which checks very closely our estimate concerning the frequency of appearance of super-novae."

While the present super-nova in Virgo is too far away to check the idea that cosmic rays originate there, calculations nevertheless indicate to Prof. Zwicky that extremely energetic particles, with energy at least equal to 100,000,000 electron volts, have been ejected from the great stellar explosion witnessed from Mount Wilson. Prof. Zwicky considers that the hypothesis that cosmic rays originate in super-novae has therefore found at least an indirect verification.

Science News Letter, April 4, 1936

CHEMISTRY

Details Reported on New German Synthetic Rubber

SLOWLY further details of the new German synthetic rubber are arriving in the United States from sources other than the official news agencies of the Third Reich.

In the current issue of *Chemical and Metallurgical Engineering*, the magazine's Berlin correspondent reports that the new manufactured rubber, known as Buna and the product of the great German chemical combine I.G., is quite different from the wartime German attempts at making a rubber substitute.

Reports the Berlin correspondent, "Without attempting to go into details, the process for producing 'Buna,' goes back to the earlier development of acetylene and converting it into butadiene. The latter is changed by polymerization into three forms of synthetic rubber."

The basic acetylene is obtained from lime and coal.

The most widely known American synthetic rubber, Duprene, appears, therefore, to be a different type of chemical compound, since an essential stage in Duprene's manufacture involves the placing of chlorine atoms on the large molecule. The substance resulting is known as chloroprene which, on standing a few days, turns to a stiff,

jelly-like substance. The jelly mass can be made into Duprene by merely vulcanizing it for five minutes at 114 degrees Centigrade.

What the German Buna rubber will cost is difficult to determine. Statements have been made that it will sell for less than any foreign product of similar properties. A cost from 60 to 80 per cent above natural rubber is one claim.

Since natural rubber has been selling for about 13 cents a pound for the last two years the cost of Buna might, therefore, be about 24 cents a pound. The word "might" is used advisedly. One undetermined factor is the subsidization of the I.G. chemical works in the development of the material.

Claims for Buna rubber are startling: 30 per cent greater wear in automobile tires made from it is among them. Slower deterioration with age and more resistance to heat are others.

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Ancient Rome knew the "modern" problem of indigent wanderers, and a proclamation by Emperor Caracalla, 215 A.D., ordered Egyptians of this type driven out of Alexandria, because they disturbed the city.

● RADIO

April 7, 3:15 p.m., E.S.T.

THREE IMPORTANT INITIALS—U. S. P.—Dr. E. Fullerton Cook of the Philadelphia College of Pharmacy.

April 14, 3:15 p.m., E.S.T.

CRIME LABORATORIES—Dr. Wilmer Souder of the National Bureau of Standards.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.