

ASTRONOMY

Stars and Comets Affected By Cosmic Radiation

No Corner of Space Escapes These Tiny Bullets; Wherever They Strike, They Break Atoms Asunder

COSMIC rays and other sorts of fast-flying atomic particles which are shooting continually about the universe between the stars, planets, and galaxies may explain many of the mysteries of astronomy, it is suggested in a scientific report published by the National Academy of Sciences.

Dr. Fritz Zwicky, California Institute of Technology physicist, points out in the *Proceedings of the Academy* (May) that cosmic rays may be responsible for some of the light received from giant stars and that the rays also produce forces sufficiently great to cause—in the course of time—astronomical changes. So far, Dr. Zwicky intimates, only the terrestrial aspects of cosmic rays have been studied by scientists.

Cosmic rays, the California scientist

states, may be expected to be scattering continually the clouds of gas molecules which are thought to be the first step in the formation of a new galaxy of stars. Gravity is the force which tends to build up these clouds of molecules.

Must Be Considered

Thus, contends Dr. Zwicky, astronomers may some day need to consider cosmic rays as an additional active force when they construct their astronomical hypotheses.

No corner of interstellar space escapes these tiny bullets. Wherever they hit matter they break up atoms, and wherever atoms are dismembered light is emitted when the pieces come together again.

The faint glow of the sky on clear

moonless nights is partly due to this unceasing rain of high speed particles. Likewise, says the California scientist, the luminosity of comet tails, certain interstellar gas clouds, and outer atmospheres of giant stars, may be due in some measure to this cosmic bombardment.

No one knows, as yet, just where cosmic rays come from or how they acquire their enormous energy. Some kind of super-thunderstorm in stars may create them. In any case they form a sort of contact between different stars and galaxies. Light is not the only messenger which one star sends to another. Actual material substance in the form of speeding atoms, ions, and electrons, are shot out from one stellar body and absorbed by another. Prof. Zwicky points out that this dissemination of matter and energy throughout the universe "may play an essential role in the evolution of stars and galaxies."

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PUBLIC HEALTH

Smallpox is Unnecessary But Still On the Increase

AMERICANS like to point with pride to achievements resulting from their readiness to make prompt practical application of scientific research. The smallpox situation in the United States provides a distinct blow to any such feeling of pride.

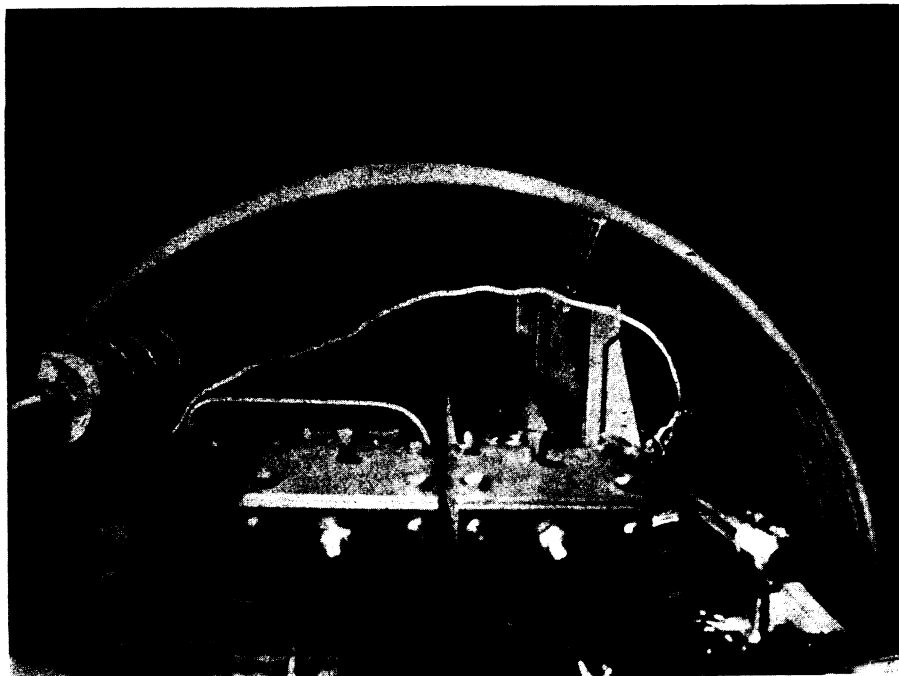
Science provided a way to prevent this disease by vaccination against it—as early as the eighteenth century. The method, which protects the individual as well as preventing the spread of the disease, was introduced into America as early as 1800. Yet in 1935 there were over 8,000 cases of smallpox in the United States.

Fifty Per Cent More

Instead of decreasing, this preventable disease has been increasing again in the United States, figures collected by the Metropolitan Life Insurance Company show. Half again as many cases were reported last year as in the year 1934.

"In view of the almost complete success attained by many other leading civilized nations in their campaigns against smallpox, this loss of ground in America last year is disturbing," state officials of the life insurance company.

The black spots on the smallpox map are in the northwestern part of the country. Seven eastern states—Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania and



WISCONSIN ATOM SMASHER

Looking down the twenty-foot long chamber which houses the new University of Wisconsin apparatus for accelerating atom particles in research on cracking atomic nuclei. Potential energy of 2,500,000 electron-volts will be developed by the device. This photograph shows a 600,000-volt electric spark jumping from the inner accelerator to the outer metal shield.

Rhode Island—had no cases during 1935. In the same year, however, eight Western states—Washington, Idaho, Montana, Wyoming, Colorado, South Dakota, Nebraska and Kansas—had over 5,000 cases.

These states have a combined population of less than 8,000,000. Their combined smallpox rate was 64 cases per 100,000 population.

"If these eight Western states were as thickly populated as are the six New England states with 131.8 persons per

square mile," the life insurance company statisticians point out, "one can readily imagine the havoc that might ensue."

Until the smallpox problem, largely centered in this northwestern area, is adequately met by "systematic vaccination and revaccination, there is no prospect that we shall reduce smallpox in this country to the level already attained by most of the civilized nations of the world."

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CHEMISTRY

Dyeing Studies Give Size Index of Cotton "Pores"

STUDIES on the size of particles of dye used to color cotton fabrics now give an index of the possible diameter of the "pores" in a single fiber of cotton.

The "pores" are so small that seven million of them would have to be placed side by side to make an inch, it was revealed at the meeting of the Thirteenth Colloid Symposium of the American Chemical Society by research chemists of the du Pont Co., Samuel Lenher and J. Edward Smith.

To allow dye particles to penetrate into the cotton fibers and produce good dyeing characteristics it was found that the particles had to be smaller than one seven-millionth of an inch in diameter.

"This size," said the chemists, "is, we believe, directly related to the size of the submicroscopic pores of the cotton fibers."

To Aid Fog Study

Also before the Colloid Symposium was presented another du Pont research report which attacks the fundamentals of such problems as the nature of fog and the physical properties of inks and paints.

E. D. Bailey, J. B. Nichols and E. O. Kraemer, research chemists, described how the new Svedberg centrifuge at Wilmington was being used to study the particle size, which is basically tied up with turbid solutions.

Turbidity, they explained, is caused by the different amounts of bending which light encounters as it passes through a solution containing tiny particles in suspension. Even though the solution and particles may each be transparent to the rays, the combined effect is a turbid appearance.

"The problem is by no means academic," said the chemists, "for it is of fundamental importance in combating fog and haze as in the illumination of airports, and in making inks and paints, which are turbid because they contain suspended particles."

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ARCHAEOLOGY

Stone Age Secrets Wrested From Old Weapon

SCIENTISTS poring over weapons in modern "crime laboratories" are able to extract many secrets that the layman would not guess at. And, acting as detectives of science, a group of German museum workers have "mined" a single weapon for information never before obtained about the way of life of people in northwestern Europe ten or fifteen thousand years ago (*Forschungen und Fortschritte, May 10*).

The weapon is a flint dagger about eight inches long, dating from the earlier part of the New Stone Age. It was found during the digging of a ditch through a moor in northern Germany. There is nothing remarkable about the weapon itself; Neolithic flint daggers are rather common throughout Europe.

Exceedingly remarkable, however, is the fact that this dagger was still in its leather sheath, with a long leather carrying strap still wrapped around it, just as the owner left or perhaps lost it, those many centuries ago. Also, part of the wooden handle was still in place, and between the wood and the stone a layer of cloth which had been inserted to improve the grip of the wood on the stone. Leather and cloth are usually

quite absent from finds as old as this, for they do not endure long against the ordinary forces of decay, but in the present case the acids in the soil of the moor had preserved them.

A group of scientists immediately went to work, each identifying some special part of the find. The leather of the sheath was sheepskin: an outer sheath decorated with shallow cuts in a spruce-needle pattern, and an inner lining of softer sheepskin. The carrying strap was of cowhide.

The wood of the handle was very difficult to identify; it seems most probable that alder was used. Confirmation of this opinion is found in millions of alder pollen grains, mixed with the moor soil at the level where the sheathed dagger was uncovered.

The cloth fragment proved to be highly interesting. The warp was almost wholly decayed, through the action of the acid water. A tiny fragment, unidentifiable by ordinary methods, proved to be linen when subjected to a new-type ultra-violet analysis. The wool was a mixture of sheep wool, goat wool, horsehair and cow-hair.

Adding all these fragments together, it was possible to conclude that the people of this region, very early in the New Stone Age, were herdsmen keeping sheep, goats, horses and cattle, that they were farmers who included flax among their crops, and that they were fairly proficient in both the tanning and working of leather and the weaving of cloth.

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SEISMOLOGY

Coast of Australia Shaken by Earthquake

A SHARP earthquake shook the northeast coast of Australia on Wednesday, June 10, at 3:22.4, Eastern Standard Time, scientists of the U. S. Coast and Geodetic Survey have calculated on the basis of data transmitted telegraphically through Science Service. The epicenter was in the general region of 15 degrees north latitude, 145 degrees east longitude.

Stations reporting were those of the Dominion Meteorological Observatory, Victoria, B. C.; the observatories of the Jesuit Seismological Association at St. Louis University, Canisius College and Fordham University; and the observatories of the U. S. Coast and Geodetic Survey at Sitka, Alaska, and Honolulu, T.H.

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