

called, was so weakened that after six hours' radiation, the amount of toxin that would kill an animal was only equal to half of one dose of the strength and amount used in skin testing for diphtheria.

This work is the modern proof of a discovery made thirty-five years ago by two French scientists, D'Arsonval and Charrin. They found that high frequency currents of 200,000 cycles per second diminished the strength of diph-

theria toxin. The frequency in the modern work was 158,000,000 cycles per second. Both the Pittsburgh investigators and D'Arsonval found that the greatest action of the rays was obtained when a film of the toxin was exposed to the radiation. Possibility of using this irradiated toxin as an immunizing agent was suggested by D'Arsonval and is considered by the Pittsburgh men worth investigating further.

Science News Letter, October 4, 1930

ASTROPHYSICS

Ten Million Volts Light Sun Like Huge Electric Lamp

Annihilation of Matter as Source of Tremendous Power Forms Basis for New Theory of Naval Research Physicist

ELECTRICITY, under a pressure of ten million volts, about the same as that of a good lightning flash, is constantly flowing from inside the sun into outside space, and so "heats the solar atmosphere to incandescence in a manner precisely like the filament of an electric light is heated by the electricity flowing through it." This is the new and startling theory that has been developed by Dr. Ross Gunn, research physicist of the U. S. Naval Research Laboratory. Dr. Gunn has discussed these implications of his theory with a representative of Science Service. A full technical report of his conclusions will shortly appear in *The Physical Review*.

Dr. Gunn pointed out that the rotation of the sun is peculiar. Not only does its equator turn faster than regions near its poles, but the rotation of the same part varies by a few per cent over a period of about six years. A similar regular change occurs in the amount of light that the sun gives off.

Good Lightning Voltage

"My study of the electric and magnetic phenomena in the sun's atmosphere has led me to an explanation of these observed variations and given a great deal of valuable numerical information," Dr. Gunn stated. "I don't need to go into technical details, but the way that we have observed the sun to rotate requires us to believe that it is constantly throwing off large amounts of electricity. This current is so large

that it wouldn't mean much to the layman for me to express it in numbers, but the sun is caused to glow by a voltage equivalent to a good lightning discharge, about ten million. It is this continually flowing current that heats up the sun like the filament of an electric light, so we might say that the sun acts like a gigantic electric light radiating its energy into space. It is the ultimate power house and stimulant of the solar system.

"We can also calculate the total power required to light the solar electric lamp. The entire wealth of our nation would buy enough electricity, at present rates, to light the sun for a millionth of a second. Yet the sun has been burning this way for at least a million years, and perhaps longer, so you might ask where the energy comes from.

"The latest researches seem to answer this question and it seems almost certain that the energy comes ultimately from the annihilation of matter. In the past few years physicists have come to believe that mass and energy are the same thing in different forms. Therefore, if processes take place in the sun which cause mass to vanish and light or electrical energy to appear, we need not be greatly surprised. This view is consistent with many other known astronomical facts. It is fairly certain that by means of some subatomic process the sun converts a million tons of its material into energy every second.



DR. ROSS GUNN

He thinks the solar atmosphere is heated to incandescence by electricity

"This loss of mass is very great, but it is small compared with the sun's total mass. It is estimated that not until a million years have elapsed will its size be appreciably affected. Therefore, it seems likely that the sun will continue to shine as it does now for a great many generations, unless some new phenomenon appears and upsets the domestic economy of the old Egyptian god!"

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CHEMISTRY

New Sulfur Soap Found to Destroy Machinists' Boils

DR. EMORY R. HAYHURST, professor of hygiene at Ohio State University, has reported to the American Chemical Society the discovery of a new kind of soap, containing colloidal sulfur, that may come into wide use.

From a new method of gas purification there is obtained a very fine grade of pure sulfur as a by-product, yielded as a product resembling a moderately moist clay. It was found that men working with the process who made use of the sulfur as a hand cleanser obtained beneficial results, so Dr. Hayhurst tried it as a soap made with an ordinary castile base.

He found that it produced no harmful effects but was definitely beneficial. Its use was tried in a machine shop where "machinists' boils" had been common for five years, and within a few months every workman was entirely free of the trouble.

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