

South Wales coal miner's silicosis, however, apparently does not make its victims liable to fatal tuberculosis, as does the other type of silicosis.

The mixture of stone and coal dusts that the South Wales colliers inhale into their lungs may contain substances that add to the harmful effects of silica particles, Prof. Cummins suggested. Other substances in this mixture may tend to neutralize the effect of the silica. He emphasized the need for further study of this disease.

Silicosis is probably on the increase. It affects to an appreciable extent the tuberculosis death rate among industrial workers exposed. These conclusions were presented to the National Tuberculosis Association by Dr. A. J. Lanza of New York City.

No accurate estimate of the number of cases of silicosis in the general population can be made because there are no mortality statistics and the U. S. Census Bureau does not list it in its reports, Dr. Lanza said.

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#### PHYSICS

## Two Kinds of Particles In Cosmic Rays

**C**OSMIC RAYS entering the earth must consist in part of both negative and positive charged particles. For if the particles were only electrons or only positives, mathematical computations show there would exist electric potential differences of thousands of billions of volts between points that are relatively close together as astronomy counts distances, such as the distance light travels in a year.

This suggestion is made by Dr. W. F. G. Swann, director of the Franklin Institute's Bartol Research Foundation in a communication to the American Physical Society.

Some investigators have suggested that the cosmic rays consist of a mixture of electromagnetic radiation or photons and negatively charged particles or electrons. Recent experiments by Dr. Swann's associates have produced evidence that some of the particles may be speeding hearts of light atoms, positively charged.

Dr. Swann renews his theory that the cosmic rays may originate in the heavenly bodies and sees no theoretical reasons why both negative and positive particles should not be emitted with high energy from them.

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#### ASTRONOMY

## Philadelphia to See Stars Shining From Sheet Metal Sky

**O**N A SHEET METAL dome, 65 feet in diameter and perforated with millions of small holes, one will soon be able to see reproduced the starry skies as they appear from any part of the earth at any time.

This will be possible when America's second optical planetarium opens about the middle of October as part of the Benjamin Franklin Memorial and The Franklin Institute, whose \$4,000,000 building is nearing completion at a location close to the city's center. The planetarium, made by the Carl Zeiss optical works in Jena, Germany, is the donation of Samuel S. Fels, and will be known as the Fels Planetarium. The building will house also a technical museum similar in scope to the famous Deutsches Museum in Munich. The museum will open at a later date, probably in December.

Eighteen planetaria are now in operation in European cities. The Adler Planetarium, opened in Chicago three years ago, was the first in the United States. Planetaria have also been assured for Los Angeles and New York.

The projection device, the part of the apparatus imported from Germany, is a glorified stereopticon, and stands in the center of the hemispherical dome. Through 119 separate lenses, images of all the naked eye stars and planets, as well as the sun and moon, are projected on the dome's white inner surface, where they are seen by the audience, seated below around the instrument. The entire machine is controlled by the lecturer through a complicated switchboard. A number of motors cause the various objects to move in their proper orbits, but at greatly accelerated speeds. It is also possible to show the sky of the southern hemisphere, picturing stars which never can be seen from the United States.

The Fels Planetarium will be the first to have a truly hemispherical dome. Previous planetaria projection surfaces were made of stretched cloth, forming a series of flat figures. In Chicago's Adler Planetarium the cloth is stretched from a series of wooden rings, so that the dome consists of zones, one above another, and each forming the frustum

of a cone. The Philadelphia dome is made of sheets of stainless steel, each one formed to the proper curvature.

As a solid metal dome would produce objectionable echoes, the steel sheets are perforated with millions of holes, one-sixteenth of an inch in diameter, and an eighth of an inch apart. Tests made by acoustic experts have shown that sound passes through such perforated metal as readily as through stretched cloth. The walls behind the dome are covered with sound absorbing pads, so that the voice of the lecturer will not be reflected, and the effect will be the same as if he were speaking on an open plain at night. In most of the other planetaria, echoes are avoided by a series of steel baffle plates hung behind the cloth dome. These reflect the sound but do not absorb it.

The astronomical section of the Franklin Institute Museum will include a public observatory, with two large telescopes, a reflector with a mirror 24 inches in diameter and a refractor with a lens 10 inches in diameter, as well as numerous models, astronomical photographs shown as transparencies, and historic instruments.

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#### ARCHAEOLOGY

## New Type of Prehistoric Pottery Found in Mexico

**P**OTTERY made by prehistoric Indian inhabitants of America, unlike any pottery known to archaeologists has been found by Dr. E. B. Sayles, archaeologist of Globe, Arizona, in the Mexican state of Chihuahua.

Dr. Sayles, who is collecting ancient pottery remains from Chihuahua with permission of the Mexican government, discovered some buff potsherds with red designs. These are unlike any of the well-known kinds of pottery made by prehistoric Indians in the Southwest. Nor have they a resemblance to anything known in central and southern Mexico, according to Eduardo Noguera, Mexican government archaeologist who has just visited Chihuahua to view Dr. Sayles' collection.

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