

PHYSICS

Cosmic Rays May Be Emitted When Magnetic Poles Combine

In New Explanation Dr. Langer Reasons How Proton, Neutron, Photon and Radioactive Phenomena Can Arise

A NEW explanation of the origin of the cosmic rays is given by Dr. R. M. Langer of the California Institute of Technology at Pasadena in a short report in the current issue of *Science*.

Dr. Langer enunciates a new theory of the fundamental particles of nature, building on the observations of Dr. Carl D. Anderson that indicate the probable existence of a positive electron (*SNL*, Sept. 24, 1932, p. 197) and using the theory of Dr. P. A. M. Dirac, British physicist, who postulates positive and negative magnetic poles as fundamental entities.

Starting with the electron and the Dirac magnetic pole as the fundamental particles, Dr. Langer reasons how the proton, neutron, photon and radioactive phenomena can arise.

Thousand-Million-Volt Energy

He pictures the neutron, the particle discovered earlier this year, as built of a positive and negative magnetic pole. Using the equations of Dr. Dirac, he finds that the two poles combined have an energy corresponding to a mass approximately that of the proton, which is also believed to be that of the neutron. In the transformation there is an energy difference of a thousand million volts and since this is of the order of the cosmic rays, Dr. Langer suggests that it is the "simplest system so far considered which could explain the emission of cosmic radiation."

To obtain a proton, Dr. Langer combines the neutron with the positive electron, of mass equal to the familiar negative electron, which was suggested by Dr. Anderson. The negative electron of the neutron is cancelled out by the positive electron, which leaves the proton.

Vanishing Mass

Dr. Langer further suggests that the photon or the sub-atomic unit of light may be formed through the combination of the two kinds of electrons, with a vanishing of mass and a velocity of light. Another possibility suggested is

that the photon may be constructed of a positive and negative electron very close together.

Dr. Langer is on the staff of the Norman Bridge Laboratory of Physics of which Dr. R. A. Millikan is director. Dr. Anderson is in the same laboratory. Dr. Langer was one of those who suggested the existence of the neutron which was experimentally discovered this year in Europe.

Science News Letter, October 8, 1932

BACTERIOLOGY

Milk Pasteurized by Conducting Electricity

YOU MAY BE drinking milk these days which has been pasteurized, not by heat from fire, but by an electric current passing through it. For apparatus which guarantees the safety of milk in this electrical manner has been installed in seventeen plants in six states and two foreign countries, and has a daily output of approximately 30,000 gallons, Prof. C. G. King of the University of Pittsburgh reported to the Electrochemical Society.

Because of its mineral salts, milk readily conducts electricity. At the same time the liquid offers enough resistance

ARCHAEOLOGY

Hippodrome Big As Football Stadium Found in Antioch

THE PEOPLE of ancient Antioch had a hippodrome big enough to take rank with famous football stadiums of today, it appears from a report on the latest discoveries by archaeologists excavating the ruins of Antioch. Prof. George A. Elderkin of Princeton, leader of the joint expedition to Antioch, has prepared the report.

Antioch's hippodrome had a capacity

of 80,000 persons, it is announced. From this, it would compare in size with the Rose Bowl at Pasadena and the Yale University Bowl.

The expedition, which is spending five years excavating Antioch, is a joint project of the Baltimore Museum of Art, the Musée Nationaux of Paris, the Worcester Art Museum, and Princeton University.

to the passage of current to cause the electricity to give up heat to the milk. "The possibility of an electrical or electrochemical effect upon bacteria in addition to the heat effect has been considered," Dr. King said, "but at present there is no clear evidence from which the question can be answered. Uniform heating accounts for the major effect, however, and it therefore seems preferable to consider tentatively the entire bacterial effect due to heating."

Tests by state health officials for organisms responsible for disease were said to have proved the efficiency of the process.

Science News Letter, October 8, 1932

PHOTOGRAPHY

Plates For Star Pictures Should Be Kept on Ice

LIKE EGGS and sausage, photographic plates should be kept in the refrigerator if their quality is to be preserved at its best. This recommendation is made by Dr. C. E. K. Mees, director of the Eastman Kodak Company's research laboratory at Rochester, in regard to plates intended for astronomical purposes.

Several large observatories, he says, have already adopted the practice of keeping their unexposed plates on ice. The lower the temperature, the more slowly do changes in the emulsion take place. The result is that those placed in the refrigerator as soon as possible, and kept there until used, are more uniform in their performance than those that have been subjected to a variety of temperatures. For ordinary photography, the lack of uniformity would hardly be noticeable.

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A special study of the Antioch hippodrome, by Prof. W. A. Campbell of Wellesley College, reveals that the structure was built in the fourth century and was abandoned in 526 after it was destroyed by an earthquake. The arena enclosed an area shaped somewhat like a football stadium, though twice as long in proportion to width. A slight curvature in the sides was designed, Prof. Campbell believes, to provide the charioteers an opportunity to maneuver for position after the turns. Destruction of the hippodrome was so complete that only the base remains.

Antioch had another stadium, the expedition discovered. Remains of this one, made of brick and stone, have also been excavated.

Among other discoveries, Prof. Elderkin describes a terra-cotta tomb in a Roman cemetery. In this tomb lay the skeletons of a man and woman so placed as to indicate that when the couple were buried the woman's head lay upon her husband's shoulder.

"Such an intimate grouping," writes Prof. Elderkin, "is, I believe, without parallel."

Science News Letter, October 8, 1932

EVOLUTION

Dogs Are Just Beginning Evolutionary Loss of Toes

FIVE FINGERS or toes on each hand or foot are so usual that it is necessary to look carefully at a horse, cow, sheep or dog to realize that all animals are not similarly equipped. The horse has only one toe which is his hoof, the cow and sheep have cloven hoofs or two toes, and most dogs lack the big toes of the hind feet. But the common ancestor of all the mammals had five digits on each extremity, like man. This is known from skeletons of prehistoric animals and a comparative study of the anatomy of living animals. Missing toes have been lost in the evolutionary process.

Prof. Charles R. Stockard of Cornell University Medical School has studied inheritance of fingers and toes to throw light on the way in which evolution operates. He now has evidence that the big toes of the hind feet disappeared or degenerated first. Then the thumb of the hand or front foot was lost. Next the little toe of the hind foot and then the little finger or toe of the hand or front foot became rudimentary, and so on.

The dog in most breeds has five toes on the front feet and only four on the hind feet. It is just beginning to undergo evolutionary loss of digits. Prof. Stockard cross-bred pure line great Danes never known to have hind feet big toes with unusual St. Bernards with great toes. As a result the hybrids all had big toes and in this respect evolution was reversed.

Some were so enthusiastically big-toed that the big toes were doubled. This happened so frequently that Prof. Stockard concluded that this doubling, or

growing of six toes where five might be expected, is a sign that evolution is about to discard the toe. The doubling of a digit is strangely enough an indication of weak or poor development and not strength.

Six fingers or toes on human beings caused by doubling of fingers or toes is not rare, for medical literature records many instances. Taking this in connection with the doubled toes in his dogs, Prof. Stockard reads in this a forecast of evolution's intention. He ventures a suggestion:

There is a possibility that the human hand of the future may possess fewer fingers.

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PUBLIC HEALTH

Parrots Quarantined In Infected Areas

DON'T make friends with any parrots, love birds or parakeets from California unless they have a certificate from a health officer declaring them free from parrot fever.

This warning has been issued by Surgeon General Hugh S. Cumming of the U. S. Public Health Service. It is intended to protect people from psittacosis, or parrot fever. If they fail to heed the warning, they run a good chance of getting this serious, often fatal disease.

Some of the breeding aviaries of Southern California, where birds of the parrot family are raised, are infected with psittacosis, an officer of the U. S.

Public Health Service found in a study undertaken at the invitation of the California State Department of Public Health. Birds from these aviaries may give the disease to unsuspecting bird owners and friends.

So, to protect the health of people all over the country the Surgeon General has issued his warning. But he has done more than warn. Upon his advice, Secretary of the Treasury Mills has just amended the interstate quarantine regulations so as to prevent birds from infected areas being shipped for sale beyond the borders of the state.

By Secretary Mills' order, the interstate transportation of birds of the parrot family by common carriers is now limited to those birds certified by the proper health authority of the State as coming from aviaries free from infection. Bootlegging of the birds is expected, however.

In Southern California, and particularly in Los Angeles, these birds are often raised in private families by ladies wishing to make pin money. Many of the birds are peddled from house to house. One case of psittacosis in Oregon was traced to a California love bird sold in this way.

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CHEMISTRY

Appearance of Age Sprayed on Copper

THE PLEASING green coloration that copper and its alloys assume after years of exposure to the weather has been considered as reliable an indication of age as the wrinkles and gray hair of an old man.

This is no longer true. A preliminary treatment with chemicals can now be used before installation to turn the freshest copper roof or spire into one of venerable appearance with pleasing patina or verdigris. Two Waterbury, Conn., metallurgists, John R. Freeman, Jr., and P. H. Kirby, have worked out a method for rapid development of patina on copper.

Discovery of the method of making artificial patina was delayed because a false conception as to chemical composition of patina had existed. Authorities had considered the patina to be a basic copper carbonate while analyses of green coloring matter on New England copper roofs from 78 to 16 years old showed that patina consists practically wholly of basic copper sulfate. In England also basic sulfate was found to be