# SCIENCE NEWS

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## THE PNEUMONIA GERM

A NEW understanding of the pneumonia germ was presented by Dr. Oswald T. Avery, of the Hospital of the Rockefeller Institute for Medical Research, at the convocation on April 2 of the American College of Physicians in San Francisco. A complex sugar plays a leading part in the germ's disease-producing activities, it appears from the research Dr. Avery described.

The pneumococcus, or pneumonia germ, is surrounded by an envelope of material known as the cell capsule, he explained. Without this capsule the germ has no power to invade the body or to cause disease and it is easily taken up and destroyed by the phagocytes or scavenger cells of the body. This important capsule is probably composed largely of a soluble sugar-like substance which is made by the pneumococcus. Each of the different types of pneumonia germ produces its own specific sugar-like substance.

The sugar of the pneumonia germ is probably not a poison like the poison produced by the diphtheria germ, but it does seem indirectly to hinder recovery from the disease. This is because this sugar tends to bind certain protective substances in the blood and thus to prevent their reaching areas of infection in the body, where they could fight the disease.

Dr. Avery and associates found that the body does not produce any enzyme which can break down the complex sugar of the pneumonia germ's capsule, but a micro-organism found in peat soil does produce such an enzyme. When this enzyme was injected into mice and rabbits suffering from pneumonia, the animals recovered. Likewise, they found that a preparation of this enzyme protected mice from a million times the number of virulent germs which invariably caused death in the untreated animals.

When the enzyme breaks up the complex sugar of the germ's capsule, the unprotected germ is ready prey for the scavenger cells of the body. Thus recovery depends both on the presence of the enzyme and on the body's ability to produce scavenger cells to destroy the unprotected pneumonia germ.

Dr. Avery also told how, in the course of this research, an important skin test was developed from the sugar of the pneumococcus. When a little of this sugar is injected into the skin of patients recovering from pneumonia, a reddened spot with a wheal in the center of it appears. The capacity of the skin to react in this way with the germ's sugar is closely connected with recovery from the infection. The results indicate that this skin test may be significant in foretelling the outcome of the disease, and may also be of value in determining the dosage of antipneumococcus serum to be given in treatment.

## ENCEPHALOMYELITIS

TWO cases, one of them fatal, in which men have apparently been afflicted with a newly-discovered brain disease of horses and mules were reported by Dr. Karl F. Meyer, of the George William Hooper Foundation for Medical Research, University of California, at the meeting of the American College of Physicians on April 4. In view of his findings, Dr. Meyer urged the assembled physicians to examine the brain and spinal cord of every fatal human case of encephalitis which was not typical in symptoms and course.

The two cases which Dr. Meyer described occurred in cattlemen who had been caring for horses afflicted with the equine form of the disease. He could not prove conclusively that they had suffered from the same disease because he was unable to examine the brain of the man who died. But from the symptoms and the fact of their close contact with the sick horses, he felt sure they had contracted the disease from the animals.

The equine disease, called encephalomyelitis, first appeared in California during the summer of 1930. It started with the onset of hot weather in June or July and with the onset of cooler weather in October, disappeared. The same thing occurred again in 1931. During these two seasons, about 6,000 horses died. Dr. Meyer expects the disease to occur in epidemic form again this season when the warm weather returns, as several cases have been reported from the San Joaquin Valley during the past two weeks.

The malady is caused by the type of germ known as a virus, which attacks the brain and spinal cord of the animal. It is apparently identical with the so-called "cerebro-spinal meningitis" which has been reported in various parts of the United States during the past 70 years. The disease caused heavy losses in the West Central States about 1912 under the name "Kansas-Nebraska horse plague."

Horses and mules are the only animals known to be affected under farm conditions, although the studies of Dr. Meyer and associates showed that the virus found in the brain and spinal cord of sick horses can produce the disease in horses, monkeys, rabbits, guinea-pigs, rats and mice when injected into the brain. Two types of the disease occur: the sleepy type in which the animals drowse until disturbed, when they may have convulsions, and the walking type in which the animals pace around and around the field.

An attack of the disease, even so slight as to escape notice, seems to give the animal immunity, that is, to protect it from subsequent infection in the majority of cases. Investigations at the Hooper Foundation are being made with the hope of producing a serum that may be used in treating the animals or a preparation that will confer immunity on them. Encouraging results have been had in a small number of cases and Dr. Meyer and associates expect an opportunity to determine the real value of their preparations during the anticipated 1932 epidemic.

## MAGNETIC POLES

THE idea that there can exist in nature a magnetic pole free from the clutches of a magnetic pole of oppo-

site sign is receiving discussion in British scientific circles. The possibility that one part of magnetism might be separated from the other was suggested by Dr. P. A. M. Dirac, the mathematical physicist of the University of Cambridge, who recently spent some months in America at Princeton University. He is recognized as one of the most brilliant of contemporary physicists.

Roughly expressed, it is conceived possible and consistent with the quantum theory of physics that a compass needle of the smallest size could be cut in two in the middle and the north pole separated from the south. No one has ever been able to separate the two poles of a magnet. Classical theory in physics considers magnetism as a manifestation of electricity, each molecule being an elementary magnet due to the orbital revolutions of the electrons inside.

In his theoretical calculations, Dr. Dirac was looking for the reason for the existence of the smallest electric charge, the electron. He found a connection between this smallest electric charge and the smallest magnetic pole, since he obtained a wave equation in his development of the fruitful quantum mechanics of the new physics, whose "only physical interpretation is the motion of an electron in the field of a single pole."

In his further reasoning Dr. Dirac finds that the strength of these lonely magnetic poles is quantized, that is, magnetism occurs in definite amounts or "gobs" in just the same way that all electricity is built up of integral multiples of the smallest electric charge, that on the electron.

Important also is his discovery of a new connection between electricity and magnetism, that allows the calculation of the attraction between the two opposite elemental magnetic poles. It is found to be nearly 5,000 times the attractive force between the electron and the proton, the negative and positive particles of electricity that are the atomic building blocks.

Magnetic poles of opposite sign have never been separated in experiments and Dr. Dirac concluded that this very great attractive force is the reason. This theoretical work may therefore have ushered into the world of science a new entity, the magnetic pole, which investigators can use in postulating how the universe is put together. The magnetic pole may come into its own as a fundamental unit alongside the electron and proton, which are the electricity units, and the photon, which is the unit of light.

Professor O. W. Richardson, of King's College, London, commenting on Dr. Dirac's technical paper that appeared in the *Proceedings* of the Royal Society last September, suggested that the isolated magnetic poles might be useful in explaining ultra-penetrating radiations, such as the cosmic rays. He feels that while it would seem difficult for such entities as the poles to be created, the possibility of their existence may have great influence on current views of how the universe is put together.

## INTERIOR OF THE EARTH

EARTH'S interior is "boiling" like a soup-kettle, with the continents floating on the surface like flakes of scum. Only, the "soup" does its boiling in terms of millennia rather than minutes, and is thousands of times as stiff as glass, so that its movements are naturally slow. This is, in rough outline, the picture sketched by Professor Arthur Holmes, of the University of Durham, England, to account for the rate at which the earth is losing its heat. He spoke at a meeting of the Washington Academy of Sciences.

The first effort to calculate the age of the earth from the known rate of heat radiation was made by the famous English physicist, Lord Kelvin. He assumed an originally molten globe, with no energy resources beyond the original dowry it brought with it from the sun. The maximum age allowed by Lord Kelvin, forty million years, was protested by geologists and evolutionists as altogether too short to allow for all the events they knew had happened.

This impasse between geophysics and geology stood until the discovery of radium and other radioactive elements in practically all the rocks of the earth's crust. This gave the planet an accessory supply of energy, which permitted a much longer time for its cooling down to its present state, and incidentally allowed the geologists all the time they wanted.

As a matter of fact, the first examinations of granitic rocks for radioactive elements yielded an embarrassment of riches in energy. There was too much of it to account for the earth's radiation, if all the rocks were equally endowed. But it was soon learned that this was not the case. Granitic rocks from near the surface contain far more radium and allied elements than the basalts from deeper in the crust; and the basalts in turn are very much more radioactive than are the still deeper rocks, called peridotites, that are assumed to make up the bulk of the stony material of the globe, filling all the space between the surface crust and the rigid central core of nickel-iron that occupies about one third of the earth's diameter.

But even with the bulk of the earth's radium thus concentrated in the crust—about sixty miles of the outer rocks—there still remains the problem of the transfer of the interior heat to the surface; else part of the earth's interior would be too fluid for our ultimate comfort, and the rest too stiff.

Two theories have been proposed to account for this. One is supported by Professor John Joly, of the University of Dublin. He thinks in terms of "waves" of thermal energy starting from the interior and working outward toward the surface, through a semi-fluid mass. As each wave travels outward, it liquefies the zone through which it is moving, and as it passes leaves it solid again. Naturally such a wave would move very slowly, but it would carry with it a great increase in energy; so that it could well give rise to revolutionary geological events on its arrival at the surface.

Professor Holmes's "soup-kettle" hypothesis visions events in the interior as consisting not of waves of energy passing outward through a stationary mass, but as a movement in the mass itself, carrying the energy with it. The deep, peridotitic stony mass, he thinks, may be sufficiently fluid to move with slow convection

currents, like the liquid in a kettle when it begins to boil; rising in the equatorial regions, flowing along at the surface just beneath the sixty-mile-deep solid crust, and sinking again at the poles, to begin the cycle anew.

This circulation from the poles to the equator and back again is not the only one; other convection currents are taken into account in Professor Holmes's hypothesis, conditioned by continents, ocean basins and other factors. The picture is also modified by the heating effect of the central metallic mass at the earth's core, which plays the part of a stove—except that it is in the kettle rather than under it.

## CONGRESSIONAL INVESTIGATION OF INVENTIONS

THE claim of an invention of a deadly weapon of destruction giving the nation possessing it command of world military affairs, which the Congress is now considering, is viewed with skepticism in scientific circles.

Extreme secrecy and broad claims do not inspire the confidence of authorities in the world of science.

If the resolution introduced to give exceptional consideration to this claimed invention of Lester P. Barlow, of Stamford, Connecticut, should be passed, the Congress would not be following the path of recognized scientific endeavor or that of the patent system provided for the protection of inventors and of the public.

Scientists recall that several years ago the Congress appointed a committee to investigate an invention said to extract free available power from the atmosphere. But the inventor, Garabed T. Giragossian, failed to submit his apparatus to the committee.

Singularly, another resolution concerning an invention of Mr. Giragossian has been introduced into the House during the present session of Congress.

Another proposal for getting quantities of power cheaply, which failed to meet tests, is that of Lester J. Hendershot. It was widely reported in newspapers in the early part of 1928. Inventor Hendershot intended to get power from the electricity of the atmosphere.

An apparatus which received wide-spread publicity about 30 years ago was the Keeley motor. It developed that the machine was a fake, power to run the motor being supplied as compressed air through a hollow tube concealed in the leg of a table on which the machine rested.

Recognized scientists always welcome the consideration of new proposals, but they insist that full details be given and that claims be made for only that which has been accomplished in actual experiment. As a rule, inventions announced with the secrecy and broad claims accorded the Barlow instrument of war seldom become important.

Mr. Barlow's claims for the new invention link it with an invention of a flying torpedo that he submitted to the Navy Department in 1917. It is said that the device now being considered will destroy cities and forces of men a thousand or more miles from its operators. The 1917 suggestion was examined by the Navy and declined. Mr. Barlow is also said to have submitted ideas for a submarine escape device. In reply to an inquiry, the Army could not find record of contact with the inventor.

The name Lester P. Barlow is not in the latest membership lists of the American Association for the Advancement of Science, the American Society of Mechanical Engineers or the Society of American Military Engineers. Neither is he recorded by the most recent Who's Who in America or by American Men of Science.

## ITEMS

HOUGHTON comet, newcomer to the heavens, has been photographed at the National Observatory of Argentina at Cordoba, by Astronomer Bobone. This comet was discovered on April 2 at the Cape of Good Hope Royal Observatory. It is moving northward, but is still ninth magnitude, too faint to be seen without telescopic aid and is visible only from the southern hemisphere. Harvard College Observatory has notified American observatories of the Cordoba observation.

THE Hydrographic Office of the U. S. Navy reports that a 7,000-mile voyage across the Pacific just north of the equator has been performed by a drifting bottle. The bottle was picked up among the Philippine Islands. The paper it contained recorded that it had been thrown overboard off the coast of Mexico by Second Officer J. C. Johansen of the American steamer *George W. Barnes*, on July 2, 1929.

ADDING a warning odor and taste to bichloride of mercury tablets would help to reduce the number of accidental poisonings by these deadly tablets, suggests Dr. R. E. Rose, director of the technical laboratories of E. I. du Pont de Nemours and Co., in a note to *Industrial and Engineering Chemistry*. Attention has recently been drawn to the importance of making these tablets a distinctive color and shape. Specifically, Dr. Rose suggests a drop of the higher fractions of synthetic alcohols for giving a warning odor that is both characteristic and not too disagreeable for use in the sick room, and a small quantity of a very bitter substance such as the salt of quinine to give a characteristic warning taste.

A METHOD for packing more power into ultra-short radio waves, the form of transmission which is now the subject of intensive research throughout the world, was reported to the Institute of Radio Engineers meeting in Pittsburgh by Mr. H. N. Kozanowski, of the Westinghouse Electric and Manufacturing Co. Many radio engineers interpret Mr. Kozanowski's achievement as a step toward static-free and fadeless radio. Because ultra-short waves travel in a straight line and can be focused, it has been predicted that they will largely overcome these two bugaboos of the longer waves now used for broadcasting. One of their great disadvantages has been the limited power with which they could be used. The new development, however, makes possible an output of at least five watts from a 60-centimeter wave-length transmitter while, according to published literature, the energy available in this range has been only a fraction of a watt.