# SCIENCE NEWS

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## HALLEY'S COMET

THAT Halley's comet had two distinct tails which appeared as one when viewed from the earth is the recent conclusion of a University of California astronomer. Although the famous comet is known to have visited the earth every 75 years for as long a time as records have existed, its peculiar characteristics had not been thoroughly studied until the present work.

The investigation has been made by Dr. N. T. Bobrovnikoff, national research fellow in physics, and will soon be reported in a Lick Observatory publication. It is based on more than 700 photographs of Halley's comet, made at Lick and other observatories in 1910, and has consumed three years of intensive study.

One of the comet's appendages was a straight, narrow streamer of deadly carbon monoxide gas, according to Dr. Bobrovnikoff, while the other of meteoric dust was more diffuse, not so bright and considerably more curved.

By tracing the motion of gaseous and dust condensations outward from the head of the comet along the tail, Dr. Bobrovnikoff has been able to determine the law of force motivating these formations. The condensations are ejected from the head of the comet by internal explosions similar to volcanic eruptions on the earth, or the flaming prominences on the surface of the sun.

As soon as they are free from the head of the comet, the knots of volcanic matter move outward along the tail driven by a mysterious unknown force which outweighs the opposing gravitational attraction of the sun.

What this force is no one can say definitely at present. It may be due to radiation pressure from the sunlight, or to the effect of the sun's electrostatic field, or to a combination of the two. Whatever its source, its activity can be determined by studying the hyperbolic motion of the jets on successive photographs.

Dr. Bobrovnikoff has found that the moving particles in the curved tail obey a repulsive force less than one half that of solar gravitation, while the forces in the carbon monoxide tail attain values up to several hundred times the sun's attraction.

The presence of dark, invisible formations at much lower temperature was also detected, from their effects on the neighboring jets and streamers.

From the behavior of the jets near the head of the comet, Dr. Bobrovnikoff found it necessary to introduce a new unknown factor in his calculations, the repulsive force of the comet's head. He obtained a value for the mass of the head amounting to one ten billionth the mass of the earth.

The predominance of violet light in the comet's luminosity he interpreted as due to fluorescence or excitation of the cyanogen and other molecules by sunlight.

## ECLIPSE PREDICTIONS BY THE MAYAS

HIGHLY accurate predictions of eclipses of the sun and the moon were made by the Maya Indians of Central America at least eight centuries before Christ, according to Dr. Herbert J. Spinden, curator of ethnology of the Brooklyn Museum. But after the Mayas predicted an eclipse, they did their best to stop it by magical means. When occasionally their predictions failed and the eclipse did not occur, they attributed this to the success of their magic.

Dr. Spinden is now on his way to Europe where he will attend the meeting of the Twenty-fourth International Congress of Americanists at Hamburg, and will give a detailed report of his discoveries, which show a surprisingly extensive astronomical knowledge among these early Americans.

Before his departure he explained to *Science Service* that the Mayas, after observing and counting the days between eclipses occurring over a period of a century or more, discovered how eclipses repeat after a certain period. In 752 B. C., on November 10, according to our present calendar, there was an eclipse visible from their capital city. These studies gave them the knowledge to predict, and they worked out a period of 260 days, each with a separate name, which in multiples made a table by which eclipses could be foretold. But eclipses, especially of the sun, were supposed to be forebodings of evil and so they tried to stop them when they found that they were due.

The Mayas were at the height of their temple-building civilization during the first six centuries of our era and in their inscriptions on these temples they frequently noted eclipse days. Their hieroglyphic symbols were very expressive, for a sun eclipse was represented by their sign for the sun combined with the sign representing darkness, so that the symbol literally means "sun-darkness." Moon eclipses were represented by the moon face with a band as if it had a toothache and wore a bandage. Dr. Spinden thinks that the idea intended was that the days of the moon were finished and that it was tied up ready for burial.

## DUST EXPLOSIONS

ALMOST all kinds of dust, even powdered metals, like aluminum or iron, are explosive when floating in the air, so the explosion that wrecked a grain elevator in Baltimore recently was not a very unusual occurrence. It was due to grain dust, floating in the air, and might have been started by an electric spark, though the cause can not definitely be stated at present and perhaps never will be ascertained.

The chemical engineering division of the U. S. Department of Agriculture is investigating the explosion, under the direction of David J. Price, in charge of the division, assisted by H. R. Brown and B. J. Culp.

Speaking to *Science Service* before the investigation, Mr. Price expressed surprise that the explosion occurred in the Western Maryland elevator, however. He said that it was a modern plant, of reinforced concrete con-

struction, with modern machinery and was well managed. In fact it was considered one of the best elevators in the country. In view of this fact, he thinks that the explosion may have been caused in some way that his investigations have never before encountered.

Though a pile of dust will not burn if a match is touched to it, and the match may even be extinguished, this is only because the grain does not have a supply of oxygen to keep it burning. When the same dust is floating in the air, each single grain has a supply of oxygen in the air around it. The result is that when it starts it burns so rapidly as to make a real explosion.

## PREVENTION OF LEPROSY INFECTION BY VITAMINS

HOPE that one of the world's oldest and most loathsome scourges may be conquered is contained in reports from Japan that Dr. K. Shiga, bacteriologist and dean of the medical faculty at Seoul, Korea, has discovered that vitamins in sufficient amounts will prevent infection of animals, and presumably man, with leprosy.

Although the leprosy bacillus was discovered in leprous sores of persons afflicted with the disease more than fifty years ago, it has hitherto not been possible to transmit leprosy to lower animals by inoculation. A solitary case of experimental transfer of the disease from man to man, from a leper to a condemned criminal in the Sandwich Islands, was not regarded as convincing evidence, because the convict had other opportunities of contracting the disease. After many futile attempts to reproduce leprosy experimentally, it has been assumed that a special individual susceptibility to the disease is requisite for its production.

This old assumption of the necessity of individual susceptibility to leprosy is now verified by Dr. Shiga. When he injected leprosy bacilli taken from human leprous sores into normal, healthy rats, the animals remained normal and showed no signs of the disease. They were not "susceptible" to leprosy. Later, however, after the food of the animals had been deprived of vitamins, they soon developed leprous sores and became victims of the disease. They became "susceptible."

If such a simple dietary deficiency accounts for animal or human susceptibility to leprosy, then it will be possible to protect people from leprosy by merely watching their bill of fare and perhaps even to cure lepers by adding vitamins to their food.

## PARALYSIS AND VITAMIN B

IS the type of paralysis that afflicts the person who has pernicious anemia caused by an absence in his diet of vitamin B? During the course of experiments designed to disclose the answer to this question, it was found that lack of vitamin B in the diet does cause paralysis of animals. Drs. Edwin F. Gildea, Egon E. Kattwinkel and William B. Castle, working at the Boston City Hospital and the Harvard Medical School, made the discovery. Some time ago it was observed that a diet lacking in this water-soluble vitamin caused neuritis in animals.

In the recent experiment, six dogs were fed the diet deficient in the antineuritic portion of the vitamin B extract. The dogs were given this diet until symptoms of a paralysis appeared and then they were given a full rich diet containing vitamin B and they immediately got better. Then vitamin B was again removed from the diet and the experiments were repeated several times in the same dogs.

After a while the dogs showed spastic paralysis, very similar to the one which human beings develop after they have pernicious anemia. The pathological examination of the sections of the spinal cord showed that the animals had approximately the same type of involvement of the spinal cord as that found in pernicious anemia.

Apparently a definite relationship exists between a diet poor in vitamin B and the occurrence of a spastic paralysis. What takes place in pernicious anemia is involvement of the spinal cord, either due to poor diet or to the fact that the stomach lacks hydrochloric acid which is necessary to digest and absorb the necessary vitamins.

## BATHS OF EFFERVESCING WATER

THE beneficial baths of a famous German watering place may now be had in the home by means of a simple apparatus called a bubble or foam distributor. The method of using this apparatus and its advantages were reported to the *Lancet*, an English medical journal, by L. Shillito, of the electrotherapy department of St. Thomas's Hospital.

The natural baths, of warm effervescing water, have been very successful in the treatment of heart disease. Because of the expense of the visit to Nauheim, however, many have been deprived of the help the baths give. With the new device the patient may have them in his own bathtub at home.

The main physiological effects of the baths are due to the temperature of the water and to the carbon dioxide it contains. This gas has an effect on the blood circulation. The carbon dioxide bath is said to be the only physical method of treatment in which the heart muscle is trained without at the same time increasing the pulse rate.

"By a gradual increase of the carbon dioxide content and a reduction of the temperature of the bath, the heart can gradually be forced to do more work, and through this increasing exercise its musculature becomes strengthened, the tone increased and reserve power augmented. The sensation of warmth produced by the strong circulatory reaction allows a lower temperature to be tolerated without shivering," Mr. Shillito said.

The health continues to improve for some months after a course of these baths. This is probably due to a slow and gradual process of repair in degenerated organs which have for the first time, possibly in years, been provided with a more healthy circulation of blood.

## FORAGE FOR DINOSAURS

THE strange plant life that the dinosaurs browsed on, as the modern cattle browse on clover or grass, was de-

scribed to the Fifth International Botanical Congress by Professor A. C. Seward, of Cambridge University, president of the congress, and Professor T. G. Halle, of Stockholm.

The transition between the last of the Paleozoic floras, which reached their height during the Coal Age, and the earliest of the Mesozoic plants, which the ancestors of the dinosaurs knew, has always been a difficult and puzzling thing to students of ancient plant life. The world evidently fell upon hard times during the Permian, which followed the Coal Age. There are evidences of extensive deserts and a much modified and often impoverished plant life in many parts of the world. A great part of the rich Coal Age flora simply vanished.

When the first of the Mesozoic plants came in, they already had a rather modern look, and by the time the height of the Mesozoic had arrived and the dinosaurs were at their best, there were plenty of trees that a present-day boy scout could identify as at least the second cousins of the trees he finds in the woods when he goes out camping. Plants far outstripped animals in the evolutionary race; modern animals did not begin to arrive until millions of years later.

It is not yet known why this apparently sudden development of plants took place and where the still missing transition fossils may be sought. Professor Seward suggested that the most likely place to find them would be in the interior of Asia, which has already yielded parts of the early history of the dinosaurs to American expeditions.

## PRUSSIAN BIRD AND WILD-FLOWER LAWS

NEW and uniform protective laws for birds and wild flowers have been enacted by Prussia, revising and replacing the old codes that obtained in the various provinces of the state, which were frequently at variance with each other. The new laws specify what game birds may be hunted and when, they list thirteen "outlaw" species that may be killed without restriction at any time and they give all the rest of the bird population the benefit of an absolute closed season.

During the proper open seasons the following birds may now be hunted in Prussia: wild ducks, wild geese, osprey, most of the quail family, sandpiper, curlew, snipe, gulls, terns and pigeons. Outlaw birds include several hawk species, all crows, sparrows, grebes and herons. Certain birds, like ospreys and kingfishers, that are protected generally may still be shot if necessary for the protection of fish ponds.

There will be no more bounties paid for the destruction of predaceous birds. Bird lime and traps or other devices for catching or injuring birds must not be used, and birds must not be hunted with the aid of artificial lights.

Certain wild animals that destroy birds, but also prey on troublesome rodents to an even greater extent, are given absolute protection. Notable among these are wildcat, pine marten, mink and dormouse.

The new list of prohibited plants contains thirty names, mostly of species which have been subjected to destructive collecting by dealers. In some cases very common and popular wild flowers, such as lily-of-the-valley, snowdrop and hepatica, may be gathered for bouquets, but their roots or bulbs must not be disturbed.

## ITEMS

SPAIN has become a recruit to the ranks of nations developing national park systems, an idea which was initiated in the New World with the founding of Yellowstone National Park in 1872. Spain now has two national parks and three areas designated as "reserves of national interest." One of the parks is in northern Spain, and the other in the northeast, deep in the Pyrenees. Both are in exceedingly rugged territory, where there are still many wild animals—chamoix, bear, wild boar, deer, etc. In the Pyrenees park there is one deep defile that leads out toward the famous last stand of the medieval hero Roland, who lost his life in a rearguard action protecting Charlemagne's army and gained immortal fame in a thousand legends.

ACETALDEHYDE vapor may have a future use in the preservation of fruit because it kills the spores of molds without injuring the fruit itself. This conclusion has been reached by two investigators who have worked on different sides of the question. Mr. R. G. Tompkins, of the Low Temperature Station, Cambridge, has shown that acetaldehyde vapor rapidly kills the spores of the molds and fungi which are likely to cause fruit spoilage. In the same laboratory, Mr. S. A. Trout has recently found that healthy fruits can absorb a certain amount of acetaldehyde vapor without any harmful effects. The acetaldehyde is used up by the tissues of the fruit and soon disappears, leaving no trace of flavor. The possibility of applying this work to the fruit industry is under investigation.

EXPERIMENTS in the manufacture of dyes from fat have been conducted by Rajendra N. Sen and Ashutosh Mukherji, in the chemical laboratory of the Presidency College, Calcutta. From castor oil was obtained a brown powder, which gave an orange tint to wool and silk. Cocoanut oil was also tried and yielded a brighter orange color, while olive oil made a brown dye for wools and stained silks in various shades of red. The method used in the manufacture of the new dye was developed by Mr. Sen. It consists in using esters of benzoic, salicylic and other acids instead of the acids themselves in the process. Chemically, fats are also esters, although they are quite different from the simpler esters of benzoic and salicylic acids.

INVESTIGATIONS by the bureau of plant industry of the U. S. Department of Agriculture show that a small amount of iodine added to the soil produces a better growth of tobacco and an improvement in its quality. But if the desirable quantity is exceeded the effects are injurious, manifesting themselves especially in abnormal thickening of the leaf, off colors, poor keeping qualities and unsatisfactory burning.