# SCIENCE NEWS

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## DANGER FROM LOW VOLTAGE ELECTRIC SHOCKS

SHOCKS by electricity of even such low voltage as that found in the ordinary household circuit are extremely dangerous and may cause death, Dr. Horatio B. Williams, of New York City, pointed out in a report to the American Medical Association.

Heretofore when people have died from shock with supposedly low voltages of electricity, such as from household circuits and appliances, it has been explained on the ground that the voltage had suddenly become greater than the usual 110 or 120 volts. Dr. Williams offered another explanation based on physiological rather than on physical grounds.

Within recent years medical scientists have learned that electricity under the pressure of a very low potential, often much less than 110 volts, affects the heart, causing a sort of tremor or wavering in its usual contraction, which physicians call fibrillation. Instead of all the muscle fibers contracting together, each of them does it separately without coordination. When the current passes through one part of the heart, this fibrillation occurs without interfering with the circulation; but when the current passes through another part of the heart, the circulation stops at once, and in all large animals death usually follows.

When the human skin is dry it is a good non-conductor, but when it is wet, large enough currents could pass to cause fatal fibrillation of the heart, Dr. Williams suggested. The skin is rarely absolutely dry, and perspiration keeps it somewhat moist; when this is copious, or when the skin is wet with soap and water, an electric current could easily pass through it. A slight cut or bruise of the skin also greatly lowers the resistance to electricity.

Household electric power lines are customarily grounded on one side. Contact between the other side and any part of the body becomes dangerous when the skin is wet enough to conduct. Water pipes, drain pipes, radiators, sinks and the conduits in which the power wires run are all usually well grounded. This, together with the fibrillation theory, explains the numerous cases of fatal electric shocks of persons touching electric appliances while in the bathtub, for instance.

"A person in a bathtub, making through his wet skin an excellent contact with the grounded drain pipe, runs a deadly risk if he happens to touch the metallic shell of a fixture which is in electrical contact with the ungrounded side of the circuit," Dr. Williams said. "Fixtures are not supposed to be in this condition, but there are so many opportunities for them to be or to become so that the danger is ever present.

"It may be dangerous to touch electric lamps and appliances with wet hands, especially when there are cuts and abrasions of the skin and particularly when there is a ground contact, as when one is in a bathtub."

Another danger spot is the chain pull switch with which many lamps are equipped. In some there is an insulating link, but many do not have this. A safe practice is to tie a piece of silk ribbon to the chain, particularly in the bathroom, kitchen and cellar. Home repair of electrical equipment may also be a source of danger. Even when the equipment works all right, the home repairman may not have properly grounded or insulated it.

## TELESCOPE MIRROR FOR THE PERKINS OBSERVATORY

AFTER three years of work, the largest telescope mirror ever made entirely in the United States has been completed at Pittsburgh, and will be turned on the heavens within a month. This huge eye, 69 inches in diameter, only exceeded in size by two others in the world, was made from a two and a half ton disc of glass cast in Washington at the National Bureau of Standards. The laborious task of grinding it to a perfect curve, correct to a millionth of an inch, has been performed in the works of J. W. Fecker, Pittsburgh telescope maker.

At the first annual assembly of amateur astronomers and telescope makers of the Middle Atlantic states, held under the auspices of the Pittsburgh Academy of Science and Art, the completed mirror was shown for the first time. Some of the smaller auxiliary mirrors that must be used with the big one in the telescope are being rapidly brought to a finish. They will be ready probably within thirty days and then they will be mounted in the 69-inch reflecting telescope of the Perkins Observatory of Ohio Wesleyan University, at Delaware, Ohio. The American Astronomical Society will meet at the Perkins Observatory from September 7 to 9, and it is expected that the new telescope will be dedicated at that time.

When the blank disc was received from the Bureau of Standards in September, 1928, it was nearly 71 inches in diameter. However, in removing it from the form in which it was cast, several large pieces had been chipped from the edge. In order to secure a clear surface it was necessary to reduce the size nearly two inches, and to remove about 1,100 pounds of glass. In its completed form the mirror weighs 3,790 pounds, and is 10 5/16 inches thick. As it is set up, thousands of small air bubbles can be seen inside it, as well as numerous striations, or regions of slightly different density. But a telescope mirror, unlike the usual looking-glass, is silvered on the front surface, and the glass acts merely as a support. Therefore, these irregularities will not affect the performance of the instrument.

The glass has been ground to a concave shape. When in use, it will face the stars, and their light rays will be focused on a smaller concave mirror above it, which will return the rays, through a hole in the main mirror, to an eyepiece or photographic plate, depending on whether the telescope is being used visually or photographically.

A total of 15,860 hours of work has been required to complete the mirror, Mr. Fecker said. In addition, many hours of waiting were necessary while it cooled to normal temperature for testing, after the grinding operations had warmed it. Its figure is now so accurate that the most delicate tests reveal no error. The tests used by the optician would reveal a deviation of a millionth of an inch from the correct shape. No test that the astronomer can apply, using the telescope on a star, are as delicate, said the maker.

The only telescope mirrors exceeding this in size are the 100-inch mirror, at the Mount Wilson Observatory, in California, and the 72-inch mirror in the Dominion Astrophysical Observatory at Victoria, British Columbia. Both were made from French glass. The former was completed by Professor G. W. Ritchey, in the Mount Wilson shops at Pasadena, and the latter in the Pittsburgh shops, then operated by John A. Brashear, Mr. Fecker's predecessor.

## GLACIERS

A RETURN of the great glaciers in 2,000 years or thereabouts is a reasonable expectation, according to Dr. O. Gunnar Erdtman, of the University of Stockholm. Dr. Erdtman, who recently lectured at the University of Michigan *en route* from Alberta to Sweden, bases this statement on a comparison of the postglacial forest history of northern Europe with the forest histories of interglacial periods.

The course of forest history is traced by means of the microscopic fossil pollen deposited by wind in lakes and bogs, where it is preserved in sediment or peat. If the various layers of this material are removed in order and studied, the composition of the local forests at successive times can be ascertained. The kinds of tree pollen and their relative abundance furnish the clue.

An interglacial period is marked by the retreat northward of coniferous forests of fir, spruce and pine. This is accompanied by the development of a warm, generally dry climate and the advance of deciduous forests of oak, beech and other trees, from the south. After a time these deciduous forests retreat southward, followed by the conifers, whose shift presages the return of the ice.

The evidence so far secured by Dr. Erdtman in Scandinavia and the British Isles strongly suggests that a southward movement of the forests is under way. Certainly it is known to scientists in both Europe and America that the present climate is more humid, and probably cooler than was that of a few thousand years ago. It is also known that deciduous forests were more extensive in southeastern Canada a few thousand years ago than they are to-day. On the basis of such facts it may not be unreasonable to regard the present period as properly interglacial, rather than postglacial. Such a possibility is often mentioned by geologists on other grounds.

Dr. Erdtman has just completed several months as a guest of the University of Alberta at Edmonton. During this time he made extensive studies of the pollen being deposited to-day in the muskeags and lakes of the northern interior, to see how accurate a picture it presents of the existing forest. In this way it is hoped to learn how much dependence may be placed upon fossil pollen as an index to forests of the past. Dr. Erdtman has found the problem complicated by the fact that certain very abundant trees, such as aspen and poplar, have pollen which is not preserved. This is not likely to affect the general conclusions reached in Europe, however.

## STEVIOSIDE

A NATURAL substance 300 times sweeter than cane sugar, rivaling some of the coal-tar products of chemical laboratories, has been shown by two French chemists to consist of a chemical union of common glucose and another compound which has little or no taste. United, they are intensely sweet; divided, they are not even as sweet as ordinary sugar.

The compound bears the chemical name "stevioside," because it occurs in a South American plant known to botanists as Stevia. The plant itself was first introduced to the scientific world about the beginning of the present century; it is a close relative of such familiar North American weeds as boneset, Joe Pye weed and the plant that causes occasional outbreaks of milk sickness in the Midwest. After its discovery by Europeans it rapidly acquired the name of "the sweetest plant in the world." A very small piece sufficed to sweeten a cup of coffee or tea.

During the past generation several partially successful attempts have been made to isolate and study the particular substance in the plant that made it so intensely sweet. It has remained, however, for the French chemists, MM. Briddel and Lavielle, to accomplish the final purification.

They have discovered, to their surprise, that the sweet crystals of stevioside, upon chemical treatment to remove a part of the combined water in them, break apart into about 60 per cent. common glucose and 40 per cent. of a new stuff which they called "steviol." The latter has no taste, but combined with the glucose it produces a most poignantly sweet substance.

MM. Briddel and Lavielle made another interesting discovery, the significance of which is not yet clear. If they freeze a 50 per cent. solution of the intensely sweet stevioside they obtain a mat of fine needle-crystals, which contain more chemically combined water than the original substance, and which are only faintly sweet. The sweetness of stevioside seems to depend on the presence of an exact amount of water in combination with the glucose and steviol; a trifle more or a trifle less spoils the effect.

## IDIOT CHILDREN

To say that an idiot child has a mental age of two years or three years is somewhat misleading, according to a comparison between the abilities of idiot children and of normal infants of the same mental age, made at the Training School at Vineland, N. J., by Dr. Edgar A. Doll and Cecelia G. Aldrich.

Although the total mental test scores of the idiots

and the infants with whom they were compared came out about the same, the individual abilities and disabilities were very different. All tests involving language ability put the idiot children at a great disadvantage, but, on the other hand, tests requiring manual dexterity showed the idiots to be far superior in this respect.

"The difference in physique is immediately apparent," the scientists comment in their report to the *Journal of Genetic Psychology*. "The normal child, barely out of his infantile walking stage, and babyish in appearance, presents a picture quite different from that of the idiot child, whose physique, although immature and underdeveloped, nevertheless has outdistanced his meager intelligence. The reaction of adults toward the individuals of the two groups is for this reason alone quite different, and in turn elicits from them a different response.

"Another marked difference is in the amount of spontaneous activity of the two groups. The idiot child will very often sit patiently through a complete examination, sometimes pointing to certain tests and frequently distracted, but easily brought back to the task in hand. On the whole, the examination may continue systematically. The normal infant, on the other hand, must frequently be enticed into cooperation, and his interest must be held throughout to avoid discontent and the familiar question, 'Where's mama?'

"The normal children seemed to recognize their own limitations more quickly than did the idiot children. Once having found a task too difficult, no amount of urging could persuade them to continue their efforts. The idiot child, however, could often be urged to continue trying regardless of the apparent futility of his efforts. The manual superiority of idiot children leads to the expectation of training possibilities."

## ITEMS

Two new game reserves in South Africa have been established by the Parliament of the South African Union. The largest of these lies between the Aub and Nossob rivers in northwestern South Africa, formerly German Southwest Africa, and has an area of about 1,800,000 acres. Here the gemsbock or oryx, entirely exterminated in other parts of South Africa, still lives in large herds; and there are other kinds of antelopes, including koodooes, elands and gnus or hartebeests, as well as lions and leopards and rare birds. The second reserve is called the Addo reserve. It has an area of over 11,000 acres and lies in the eastern part of the Union. It is the last refuge for a few of the South African elephants, which are much smaller than those of Central Africa. There are 40 of these now on the reserve, and the government has taken care to provide sufficient watering places for them. Lack of water has been one of the causes of their extinction elsewhere. These new reserves are cared for by the South African National Park Department, which also administers the Kruger National Park, perhaps the greatest game reserve in the world.

WITH the age-old hills of Santa Fé as a perfect setting, the new Laboratory of Anthropology, endowed by John D. Rockefeller, Jr., was officially opened to students on September 1. From all parts of the United States men and women engaged in anthropological studies trekked to Santa Fé to attend the opening exercises and to take part in the three-day conference of archeological field workers convening in the new building on September 2, 3 and 4. For many years Santa Fé has been a rendezvous of men and women interested in the aboriginal life of the great Southwest. Consequently it is most appropriate that the first Laboratory of Anthropology ever opened in the United States should be established in the very heart of a country where students may not only excavate and study the ancient ruins but also visit the nearby pueblos and supplement their digging by catching their "archeology alive." Mr. Jesse Nusbaum, formerly superintendent of Mesa Verde National Park, who is now departmental archeologist for the Department of the Interior, is director of the laboratory.

LARGE brown patches of dead grass on Ohio golf courses and lawns are not due to the extremely hot weather but a heavy attack by the sod web-worm, entomologists of the Ohio Agricultural Experiment Station have discovered. Not a new insect, the half-inch-long black worm has been encouraged by this year's good insect weather. It lays its eggs in lawn or turf grasses and the larvae hatch in two weeks. The insect keeps away from clover, and a patch of fresh green clover plants in the dead grass is a sign of its presence. Arsenate of lead powder dusted on the grass and soaked in with water will control the pest.

WHEN Colonel and Mrs. Lindbergh, *en route* to Asia, stopped at Churchill on the western shore of Hudson Bay, they saw the terminus of a new railroad leading from the Canadian wheat lands to Canada's newest port and outlet to Europe. Churchill Harbor will soon be a thriving grain shipping center during the short summer season when ocean ships can reach the Atlantic through Hudson Bay and Hudson Strait, a route that a few years ago was followed only by vessels of exploration. The port will be opened commercially next summer, and then Canadian grains will have a thousand miles less traveling to do in reaching Liverpool by way of this route than by the Great Lakes route now largely used.

GOLDFISH can be trained to develop a tolerance for the poison of tobacco, but smokers should not therefore feel that any amount they take in is harmless after they have once acquired the habit. This is the advice of Drs. Leon Binet and C. Zamfir, French physicians. Increasing amounts of tobacco-water, made by soaking two grams of good Maryland tobacco in a liter of river water, were placed in the goldfish bowl every other day. On alternate days they got fresh water again. After 51 days the goldfish survived exposure in water so strong that it killed unprepared goldfish in an hour. After 66 days they swam in the extract straight.