SCIENCE NEWS

Science Service, Washington, D. C.

ELECTRICITY FROM THE AIR

ELECTRICITY of nearly two million volts, capable of jumping gaps of nearly 15 feet, has been obtained from the air by Drs. A. Brasch, F. Lange and C. Urban, three members of the staff of the Physical Institute of the University of Berlin.

Mount Generoso, in Switzerland, near Lugano, was the scene of these experiments and the experiments will soon be resumed. This mountain is noted for the frequency of electrical storms upon it, and also it has the advantage of being easily accessible.

It was found impossible to make use of kites for the purpose of collecting the atmospheric electricity, because use was made of a wide-meshed wire net having an area of several hundred square yards. It was out of the question, they found, to suspend this from kites or balloons, because such means would be particularly undependable during a storm, when the experiments were made.

In order to get the net as far as possible above the earth, they hung it on a cable between two mountain peaks. The span was about 1,800 feet, and the height of the net above the ground about 250 feet. At each end were chains of insulators capable of withstanding as much as 3,000,000 volts.

Another problem was to prevent what are called brush discharges, in the conductors which carried the current from the net to the measuring instruments. The intensity of these discharges is less, the greater the radius of curvature of the conductor, so that the discharges would be less from a large hollow cylinder than from a smaller solid wire, with the same amount of metal. As long cylindrical conductors would have been difficult to transport to the mountain, Dr. Brasch and his associates made use of a string of short, round-ended cylinders.

From a lightning-proof metal house the observations and measurements were made. The spark gap, under the last of the short cylinders, could be regulated from this post, and, from the length of the gap across which the spark would jump, the voltage was determined.

As the chief electrical storms of the neighborhood are in the summer, and as the apparatus was not completed until last August, the best storms had to go unused. One storm occurred after it was completed, and indicated the success of the method. The spark gap could not be made larger than about 15 feet, but the sparks easily jumped across it at the rate of about one per second and continued for thirty minutes at a time. Also, it was found with an auxiliary collecting antenna, and with distant storms that affected the main station, that a discharge of once a second was possible at all times.

During the winter months, the experiments were discontinued, but the apparatus was left in place. The scientists are now preparing to return, to take full advantage of the storms this season. With the antenna about three hundred feet above the earth, a height that could easily be obtained, voltages as high as thirty million would result.

Dr. Brasch and his colleagues credit Benjamin Franklin with being the pioneer experimenter in the field in which they are working. One possible use of these huge voltages, they say, is to generate extremely rapid cathode rays, similar to those formed in the tube recently developed by Dr. W. D. Coolidge, of the General Electric Company. These are similar to one of the principal radiations from radium, but with 30 million volts, the artificial rays would travel even faster than those emanating from radium itself.

AN ECLIPSING VARIABLE STAR

THE star epsilon Aurigae in the constellation of the Charioteer, near the bright Capella, which is now directly west in the evening, is now getting fainter, several months ahead of the schedule, according to a report made by Dr. Joel Stebbins, director of the Washburn Observatory of the University of Wisconsin.

Epsilon Aurigae is one of a class of stars known as eclipsing variables, that periodically change in their brilliance. They consist of two separate globes, one brighter than the other, which revolve around their common center of gravity. When the dark one comes between the brighter orb and the earth, the light is diminished.

When at its brightest, epsilon Aurigae is of the 3.4 magnitude, but when eclipsed diminishes to magnitude 4.1. With the naked eye, on a dark night, stars down to about the sixth magnitude can be seen. The average period between the times of minimum brightness of the star in Auriga is about 9,900 days, one of the longest known periods for a star that so changes in brightness.

With his colleague, Dr. C. M. Huffer, Dr. Stebbins has been studying the changes in brightness of various stars with the photoelectric cell. This device converts the faint light from the star into a minute electric current, which can then be measured with a delicate galvanometer.

Not until later in the year was epsilon Aurigae expected to begin to diminish in brightness. Observations made on four nights since January 22 by Dr. Stebbins and Dr. Huffer show that in that time the star's light has decreased more than a tenth of a magnitude, so that it is now changing at the rate of about eight hundredths of a magnitude per month.

Just what might cause this unexpected change in brightness is uncertain, but Dr. Stebbins expects to continue observing the star in the hope of learning more about its queer behavior.

PROTECTION FROM LIGHTNING BY TALL BUILDINGS

TALL buildings and lightning rods mounted on high towers protect neighboring structures from lightning, pro-

vided they are not so high as to extend out of the cone of protection. This protected area extends around the base of the high building for a distance of between two and four times its height. Imaginary lines drawn from the top of the building to the edge of the protected area define the protected cone, says F. W. Peek, Jr., in charge of the General Electric Company's high voltage investigations at its laboratory at Pittsfield, Mass.

Mr. Peek's investigations have been made with artificial lightning at pressures of as high as three and a half million volts. These man-made flashes have been used on small models of buildings. However, confirmation of his discoveries was obtained by studying a natural electrical storm that occurred in New York last summer, and during which the New York World building was struck. Though this building is close to the Woolworth Tower, and is in the 1,100 foot circle around its base that is protected, the dome of the World building extends for about a hundred feet outside the cone, and that is the reason that it was struck, explains Mr. Peek. If it had been 200 feet closer to the Woolworth building, it would have been protected.

Practical application of these experiments, says Mr. Peek, has already been made in California, in safeguarding oil storage tanks from lightning. Several tall rods, placed outside the big reservoirs, provide overlapping cones of protection and reduce the danger to a minimum.

HOW TO LIGHT PAINTINGS

PHYSICS has come to the aid of the artist in showing how paintings can be hung to best advantage in picture galleries.

If pictures are to be seen as the artist meant them to be seen, according to Dr. J. W. T. Walsh, of the National Physical Laboratory, the lighting should be as much like unaltered daylight as possible. In cases where natural lighting is used, the windows through which the light passes, and the glass in front of the pictures should be practically colorless. Also the decorations of the roof and walls should be neutral in tone, especially where they are liable to receive direct sunlight.

One of the practical difficulties in the arrangement of old paintings is that the old paints may tend to fade. Ultra-violet light is now thought to be to some extent responsible for this condition, and to prevent it one should allow no direct sunlight to shine on the pictures.

Another great difficulty often encountered in picture galleries is the reflection of spectators in the picture glass, or a reflection of the pictures on the opposite wall. The former type of reflection can be avoided by having a roof design in which the windows are so arranged that no direct light falls on visitors, although the pictures receive full illumination. Reflections of pictures opposite are of course best prevented by not having any pictures on the opposite wall, and some modern galleries are designed with pictures on one wall only. If this is impossible, reflections can be avoided by erecting a screen the whole length of the room.

THE OXYGEN-CARRIER OF THE BLOOD

AN important step toward the understanding of how the process of breathing sustains life has been made by Professor Otto Warburg who, in an address before the Kaiser Wilhelm Association for the Advancement of Science at Berlin, demonstrated the constitution and action of the ferment in the blood which controls the conveyance of the oxygen of the air from the lungs to the muscles. So minute an amount of this ferment or catalyst is present in the blood that it can not be isolated, yet it is an essential factor in the supply of vital energy to all animals. Its chief constituent is haemin, a chemical compound which has been known for the last seventy-five years, but which was first made artificially in the laboratory a few months ago by Professor Hans Fischer. It contains iron and is a component of the familiar red coloring matter of the blood, haemoglobin.

But the ferment is ten thousand times more sensitive to light than haemoglobin. The color of the light makes more difference than its intensity. Rays of a certain frequency will be absorbed while light of another wavelength will not affect it. These iron-containing compounds of the blood are tuned to react to select radiations like a fine radio apparatus. One of the derivative compounds can act as a sensitizer to sunshine so that a person taking a dose of it would be light-struck, perhaps fatally, by ordinary daylight, while he would be all right so long as he remained in a dark room. Pigs are sometimes so sensitized by eating buckwheat as to be sickened by sunlight.

The "breath-ferment" described by Warburg is beneficially affected by light, for when it is poisoned by combination with carbon monoxide such as may come from automobile gases, the combination is readily broken up by faint light, and the ferment can then resume its function of carrying oxygen.

GLUCOSE FOR ENCEPHALITIS

THE treatment of encephalitis by the injection of glucose has awakened considerable interest among specialists at St. Elizabeth's Hospital for the Insane. Dr. Walter Freeman, who has made many researches on encephalitis, states "that even though the way in which it works is uncertain, this mode of treatment undoubtedly offers something of importance in the treatment of nervous diseases."

The improvement of acute cases of encephalitis by glucose injections was recently announced by Dr. Leland B. Alford, of St. Louis, Mo. The action of the glucose is not well understood, but it is believed that the compound exerts a protective action on the nervous system.

The first clue to the beneficial action of glucose, according to Dr. Alford, came from its administration as nourishment to an encephalitis patient who was delirious and refused food. This took place in November, 1926. To the surprise of every one the patient began to improve. On Christmas day she recovered her senses and by New Year's day returned home and has remained well ever since. Glucose seemed the most probable factor in

this unprecedented recovery and so was given a trial in another acute case which likewise registered rapid improvement.

The method was followed up with good results in as many as forty acute cases. The injections have no harmful effects, it was stated. It has, however, brought about only slight improvement in chronic cases. The chronic form of encephalitis is particularly stubborn and to date few ways have been found of combatting it.

It will be many years, Dr. Freeman pointed out, before the glucose treatment can be properly evaluated but, he added, any method that gives hope of relief in dealing with this unfortunate disease, is worthy of trial and further research.

FAST TRAVEL IN THE ORIENT AND THE CONTROL OF DISEASE

AIR lines and bus routes in the Orient make hard work for the European health officials whose job it is to hold in check the time-honored diseases of the East.

In Iraq two new lines of communication, according to Dr. C. P. Thomson, president of the Egyptian Conseil Sanitaire, now have to be taken into consideration when cholera breaks out.

The first is the weekly airplane trip from this city to Basra by way of Palestine and Bagdad. Only 12 hours are required to reach Bagdad from Cairo, and 27 to reach Basra, since the planes do not fly by night. When this route has been extended to Karachi in western India, Dr. Thomson pointed out, a potential cholera victim from an infected center in that country could easily be on board ship at Port Said in three and a half days, before the incubation period of the disease would be completed.

The second avenue of contact is by the motor route from Bagdad to Beirut *via* Damascus, which takes only 29 hours. The traffic on this line is increasing constantly while pilgrims, always a fertile source of epidemic spreading, have already made use of it to the number of 2,000.

Medical authorities of Syria control the motor traffic while that of the airway is under strict medical surveillance by Palestine and Egypt. Travelers coming from the infected territory may be released from quarantine at the aerodrome if they can show they have received two injections of cholera vaccine, the last administered at least six days before.

During the cholera epidemic in Iraq in the summer of 1927, a supply of cholera vaccine sufficient for 700,000 doses was provided, from which about 40 per cent. of the inhabitants of infected towns were vaccinated.

ITEMS

CORONIUM, the mysterious substance in the sun's corona that only manifests itself in spectrum photographs made at the time of a total solar eclipse, is probably due to argon, third most abundant gas in the air. This is indicated in researches carried on at the Ryerson Physical Laboratory of the University of Chicago by Dr. Ira M. Freeman. "Coronium" was first found in 1869 when, in the eclipse of that year, astronomers noticed a strange line of a green color in the spectrum of the corona. This is the extremely rarefied outer layer of the sun that is visible only when the central disc of the sun is obscured by the moon. Ever since that time physicists have been trying to find the cause of it and a group of unknown lines that were later discovered. Dr. Freeman has found that 18 of these lines can be identified as those of the element argon, which occupies nearly one per cent. of the atmosphere. Other observations of the sun with the aid of the spectroscope have never shown the presence of argon, but, Dr. Freeman points out, it may well be that it is present but that it is quite possible the conditions on the sun are not just right for it to be in evidence ordinarily.

THE aid of ultra-modern chemistry has been invoked to salvage another relic of the remote past. An ancient leather roll of Egyptian writing had lain unopened for 50 years in the British Museum because it was so brittle that no one dared unroll it. Experiments with a broken fragment of the leather in the museum's laboratory, however, finally gave scientists a clue as to how to handle the mysterious manuscript. Several thin coatings of celluloid were soaked into the pores of the leather, after which it was cemented with strong celluloid on to a piece of celluloid-treated cheesecloth. In this way it was unrolled without a break and pressed flat between two glass plates to dry. It remained perfectly flat after drying and can now be read with ease.

ROMAN artisans in England only two to three centuries after the time of Christ knew how to weld iron and how to join or "solder" two pieces of iron together with copper, the Institute of Metals was told at its meeting by Professors J. Newton Friend and W. E. Thorneycroft, of the Technical College, Birmingham. The specimen examined by them was a deep iron ferrule, like a modern napkin ring, that was unearthed during excavations of the Roman city of Uriconium located on the river Severn and destroyed about A. D. 380. Lead pipe manufactured and laid in Rome's water system 1,800 years ago was pronounced to be in perfect condition by William A. Cowan, chemist of the National Lead Company, Brooklyn, N. Y., in a communication to the institute. Analysis showed that the same lead was used by the Romans in England and Italy.

THE Ruhr industrial region, recently restored to normal operation following the withdrawal of the French, has given a striking illustration of the damage wrought by factory smoke not only to trees and gardens in the cities, but to the farm crops throughout the countryside. When the French occupied the region in 1923 the Germans adopted a policy of "passive resistance," closing down all the factories. With the air cleared of its load of smoke and acid fumes, the farms of the Ruhr Valley yielded full crops for the first time in many years. Then the French withdrew and the chimneys started smoking again, and now the crops have dropped back to their previous low level.