

SCIENCE NEWS

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THE EARTH AS A POWER HOUSE

THE earth itself is a huge electric dynamo generating enough current to supply light, heat and other electrical needs to the ten largest cities in the United States for at least one million years. Recent researches on thermal reactions inside the earth, conducted by Dr. Ross Gunn, of the Naval Research Laboratories, and inventor of a short-wave oscillator and airplane altimeter that have been taken up by the radio and aircraft industries, indicate that the earth is the greatest known electrical wonder in the universe.

Dr. Gunn has published a theoretical treatise on his studies in *The Physical Review*. The intricate theoretical problem of the earth's electrical condition showed that the currents generated inside the earth amount to more than 200,000,000 amperes. Dr. Gunn is careful to emphasize that this tremendous source of energy is unavailable for use by man. Like atomic energy, it will be kept in nature's storehouse for the use of the generations of perhaps a million years in the future.

According to Dr. Gunn, the tremendous electrical currents that are produced inside the earth arise from the motions of the tiny electrical charges known as electrons. The motions are caused by the very high temperatures existing well inside the earth's crust.

Due to a peculiar and complicated type of interaction the electrons are caused to drift around the earth's axis of rotation. This drift of electrons constitutes an electric current which is so large that if it were sent through the huge cables supporting Brooklyn Bridge it would melt them in less than a thousandth of a second.

The presence of the currents that flow in the hot interior of the earth may be detected by any one who cares to observe the action of a magnetic compass on the surface of the earth, for it is precisely these deep-seated electric currents that orient the compass needle in a north-south direction. He adds that it has been known for thousands of years that the earth behaved like a giant magnet, but the mechanism by which this magnetism was produced was not understood.

The study pursued by Dr. Gunn sheds much light on the manner in which the earth was originally formed. His work and known facts relating to the earth's magnetic field indicate that the earth was part of the sun or some other liquid star millions of years ago. When the earth was thrown off the sun, it came off in such a manner that the hemisphere now embraced by the continents was made up of relatively cool surface material having a mean temperature of perhaps 50,000 degrees while the hemisphere embraced by the Pacific Ocean came from deeper and much hotter layers.

This unsymmetrical temperature distribution of the earth's interior is said to account for the volcanic activity and earthquakes in the countries in and adjacent to the Pacific Ocean.

FORECASTS OF ENGLISH WEATHER

STORMS which hampered the early days of the Boy Scouts' jamboree in England are but a forecast of a return to normal rainfall for the second half of 1929, after an exceedingly dry six months, according to predictions of Dr. Dinsmore Alter, professor of astronomy at the University of Kansas.

A test prediction by Dr. Alter, published in the *U. S. Monthly Weather Review* for June, 1927, forecast the dry season through which the British Isles have just passed. If the observed rainfall follows the prediction for the next six months as closely as it has in the past several years, England may look for approximately normal rainfall during the rest of the year. After a damp spring in 1930, the prediction indicates that England may experience two years of sub-normal rainfall.

Dr. Alter has published a dozen papers on periodicity of rainfall, basing his studies on records from many sections of the world. The British Isles and the Pacific Coast of North America, with their purely marine types of weather, and the purely continental types as found in the Punjab of India and in Siberia gave the most consistent results when mathematical formulae were applied.

The British Isles predictions, for example, were based on a study of data from six different places, covering the years from 1834 to 1924. From these data, a periodogram was computed with a dozen or more peaks, the four principal of which were applied in producing the chart published in the United States two years ago, and making test predictions up to 1940.

Actual reports received since the test prediction was published have been charted, and found to have a high correlation. The predicted excess of rainfall by 12 per cent., in the spring of 1926, was found actually to be 18 per cent. excess of normal. The predicted excess of 3 per cent. in the fall of 1923 became an actual 4 per cent. deficiency, but the predicted excess rainfall for the latter part of 1927 and all of 1928 was even exceeded by the actual figures. Reports received by Dr. Alter for the first three months of 1929 showed even less rainfall than the 22 per cent. he had predicted. The prediction is "practically normal" for the second half of this year.

Dr. Alter leaves for Europe the latter part of August to spend a year under a fellowship granted by the Guggenheim Foundation. He expects to spend the greater part of his time in England and Scotland, examining rainfall records, many of which are only in manuscript form, in a hope to discover further data that will make his predictions more accurate.

He disclaims all hope of being able to predict long in advance the weather probabilities for any particular day, but he does believe that there are possibilities in predicting in larger units the possible weather, especially as to rainfall. Such predictions, if reasonably accurate, he believes, would be of great benefit to agriculture.

COOPERATION OF THE UNITED STATES AND MEXICO IN FIGHTING INSECT PESTS

"INTIMATE collaboration between the United States and Mexico on plant quarantine and pest control is indispensable, we are convinced," said Mario J. Hoyo, official representative of the Mexican Government and chief of the Plant Protection Service of that country, at the tenth annual meeting of the Western Plant Quarantine Board which was held recently in Salt Lake City.

"A better understanding of mutual quarantine problems would facilitate beneficial interchange of agricultural products with ample protection to the agricultural interests of both Mexico and the United States," he said. "In creating our zone of agricultural defense against the further spread of the Mexican fruit-fly, the pink boll weevil, the avocado weevil, the potato weevil and other pests in our own country on the northwest Mexican coast, we are not only defending our interests in Sonora, Sinaloa and Nayarit, but of your western states as well."

Mr. Hoyo described the fumigation plant which the Mexican Department of Agriculture has built in Guadalajara in the State of Jalisco, the gateway to the Mexican west coast, which for some time was the biggest in the world. The fumigation chamber is a steel vacuum cylinder about 165 feet long and 17 feet in diameter, and divided into two sections. The first section is 45 feet long and in it one railroad box car may be fumigated. The other vacuum chamber has a capacity of 25,000 cubic feet and can take care of two box cars at a time, but can be enlarged to accommodate four. The cars are run in on tracks laid inside and firmly fixed to the sides.

Liquid hydrocyanic acid gas is used for fumigation. Two hours of high-vacuum fumigation are used for box cars loaded with cotton, and one hour for other vegetable products. There is a special inspection service of all railroad cars which come from the Mexican interior and are bound for the west coast, and it is absolutely forbidden to take fruits or vegetables or other prohibited products under quarantine on such trains.

Mr. Hoyo pointed out that Mexico is but a prolongation of western United States, and that the Rocky Mountains which divide the United States into east and west run all the way to the Rio Grande Valley, leaving but an insignificant portion of Mexico out of the western realm. This means that the United States and Mexico are a geographical unit and that the agriculture of the two countries is of necessity intimately linked.

"The newest and most serious agricultural menace is one which your country and ours must face together," said Mr. Hoyo, referring to the Mediterranean fruit-fly which has recently made its appearance in Florida and other eastern American states. "Mexico is as much concerned as western United States in keeping this pest out, and our fruit culture is in the same dangerous position as yours. We are making every effort to protect our frontiers and are enforcing the quarantine against its introduction with all the means at our disposal.

"Our fight would be a hopeless one if the insect should become an element of the California citrus groves. It

would necessitate strict vigilance on our part along the Mexican border against bootlegged fruits, and would sap our available funds for pest control and quarantine work in general, with the result that both sides would suffer.

"The Mexican fruit-fly is an international problem, and our hopes are that the entire plant protection and quarantine activities of the North American continent will be organized against this most dangerous pest of our fruit culture. The Mexican Government is prepared to collaborate in every possible manner."

CANCER CULTURE CARRIED BY THE GRAF ZEPPELIN

THE *Graf Zeppelin* on its speedy trip from Germany brought to the Cancer Research Laboratory of the University of Pennsylvania cultures of cancer cells of a special rat sarcoma type that would not have survived the long steamer voyage across the Atlantic.

"The cultures must be transplanted every few days and the *Graf Zeppelin* offered a quick method of transportation so that they may be transplanted on their arrival here," explained Dr. Ellice McDonald, director of the Cancer Research Laboratory of the University of Pennsylvania's Graduate School of Medicine, to whom the valuable cancer cultures were consigned. "It is almost impossible to carry the necessary laboratory apparatus to make these transplantations on board a steamship."

The growing cancer cells came from the Kaiser Wilhelm Institut für Biologie in Berlin through arrangements made by Dr. Raymond Parker, of Dr. McDonald's staff, and Professor William Seifriz, of the University of Pennsylvania. Dr. Parker has been studying this year at the institute with Professor Albert Fischer.

Although not the same kind of cancer that affects human beings, the rat strain when safely established in its new American home will prove useful in the laboratory's study of mitosis or cell division. It is also expected that the cancer cultures will throw new light upon the possibility of the modification of the rate of growth or cell division by various chemicals, and it is possible that such experiments may prove to be the starting point of new knowledge of the human disease. Human cancer like the cancers of lower animals, such as the rat, is primarily a disease of cell division and the proposed studies upon the *Graf Zeppelin* culture are therefore fundamental.

AIRPLANE SERVICE ACROSS THE GRAND CANYON

THE north and south rims of the Grand Canyon of the Colorado are now spanned by a scheduled passenger transportation line that for the first time in history betters the two-day time of the mule-back trip down into and across the canyon which heretofore has been the only regular means of crossing the canyon directly.

Airplanes make the trip in thirty minutes' flying time. Propelled by three 550 horsepower motors, the fifteen-passenger airplanes are using a natural field in the Kaibab forest, 8,000 feet in altitude, claimed to be the highest regularly used airport in the world. It is often

necessary to scare herds of deer off the field before the airplanes can be landed.

From the south rim, 7,000 feet in altitude, the airplane rises another 3,000 to 4,000 feet in order that the great chasm, over a mile deep, can be traversed safely. An emergency landing field on one of the great terraces in the canyon's depths has been cleared and a test landing made.

In addition to serving as a quick means of transportation for those desiring to travel directly southward or northward between Salt Lake City and other areas north of the canyon and southern Arizona, previously a two-day round about rail trip, one day or one afternoon excursions from one rim to the other and return have been added to side-trips possible from either rim of the canyon.

Automobilists can pass from rim to rim over a circuitous route and merely passable roads *via* the new Lee's Ferry Bridge, but this requires at least two days.

Scenic airplane trips over the Grand Canyon from the south rim have been available for over a year but the first landing of the passenger airplanes on the north rim was made this summer. The regularly scheduled air line across the canyon has just been placed in operation. The first airplane flight over the canyon was made by an army officer, Lieutenant Alexander Pearson, on June 10, 1921.

Traversing the canyon by airplane costs approximately two thirds as much as crossing on mule-back.

ITEMS

THE number of claims which have been filed with the Ohio Industrial Commission for injuries received while using frozen carbon dioxide, or "dry ice," for industrial purposes, has caused the U. S. Government to issue a warning to workers handling this product. The "dry ice" has recently come into extensive use for commercial purposes, especially in ice-cream and dairy plants. Its temperature is about 110 degrees below zero or 140 degrees below the temperature of ordinary ice. Although it looks harmless enough it can do considerable damage to the person who handles it with bare hands. Numbness and pain, not only in the fingers but also in the hands and arms, are the first symptoms, and in some cases a form of neuritis is produced.

THE U. S. Bureau of Mines, in cooperation with the bridge and tunnel commissions of New Jersey and New York, has recently conducted an experiment to discover whether persons exposed for long periods of time to the exhaust fumes in the Holland Vehicular Tunnel would become ill. Six men volunteered to breathe the fumes for from four to seven hours each day over a period of 68 days. The gas mixture used in the experiment contained 2, 3 and 4 parts of carbon monoxide to 10,000 parts of air. Some of the men had frontal headaches after breathing the mildest mixture for 3½ hours and after an exposure of only 1½ hours to the strongest mixtures. After four hours of exposure to the 4-part mixture the blood had absorbed the gas to an extent of 30 per cent.

No serious effects were noted in the short time that it would take to drive through the tunnel.

INHALING carbon dioxide gas temporarily restored the sanity of mentally deranged patients at the University of California Medical School. The experiments were conducted at the request of Dr. A. S. Loevenhart and Dr. Ralph M. Waters, of the University of Wisconsin, the former of whom has since died. The tests were made by Dr. Chauncey D. Leake and Dr. Mary E. Botsford, of the University of California, with the help of Dr. Arthur E. Guedel, of Beverly Hills, and some six other physicians. Eight trials of the treatment were made on five cases of the type of insanity known as dementia praecox catatonica. In all but one trial there was a fleeting return of intelligence which enabled the patients to answer questions rationally, or to exhibit recognition of their surroundings. These periods of rationality lasted from ten to fifteen minutes.

THE annual death rate on the Gold Coast has been reduced from 100 per thousand of non-official residents, which was the rate in 1897, to 9 per thousand. A report received by the American Medical Association credits this improvement in health conditions to the opening up of the country by railways, to the installation of ice and cold storage plants, and to the efforts of scientists in combating the diseases prevalent in that region.

RUSSIA is no longer a customer for German potassium salts, source of fertilizers and other widely used commercial chemicals. In 1926 the Soviet Government started investigations to see if Russia did not have any deposits of her own of these valuable materials, with the result that near Solikamsk in the Ural Mountains potassium beds were found that the Soviets claim to be among the largest in the world. A mine has been constructed, workmen's quarters erected and mining operations are said to have begun this summer. Some 5,000 men are employed to handle the production which, it is estimated, will reach around 1,300,000 tons per year.

COMPUTATIONS of triangulation observations of the Peak Garmo have been completed by Richard Finsterwalder, a member of the Soviet-German expedition to Pamir, showing that Peak Garmo has a greater altitude than any other mountain in the Union of Socialist Soviet Republics. Its height is computed as being 7,495 meters, or about 24,583 feet. No mountain on this side of the world exceeds Peak Garmo in height. The tallest in North America, Mount McKinley, is only 20,300 feet in height, while South America's loftiest peak reaches but 23,080 feet. Peak Garmo is also taller than any of the peaks in the Alps. In fact, the only mountains which are known to be taller are some of the peaks in the Himalayas and other of the tallest Asiatic mountains. Peak Garmo lies among the wild and inaccessible summits of the Pamir Mountains. Its heights have probably never been reached by any human being.