

GEOPHYSICS

Radioactivity of Rocks Affects Lightning Risk

NOT ONLY the height of a building or of a tree, but also the nature of the ground on which it rests, is of prime importance in determining whether it will be struck by lightning. That lightning chooses the path of least electrical resistance is the contention of L. N. Bogoiavlensky, Soviet scientist, in a letter to *Nature*. The resistance of the air, he explains, is influenced by the radioactivity of the rocks below it, since radioactive materials constantly give off radiation which increases the ionization and the conductivity of the air.

From the frequency with which the supports of an electrical power line have been damaged by thunderstorm, the Soviet geophysicist drew a graphic picture showing the parallelism between the number of lightning flashes that strike the ground, the electrical conductivity of the air, and the distribution of radioactive rocks below the surface of the ground. These rocks lie sometimes at considerable depths, more than 100 feet, but their radiation seems to be effective.

The measurements which led to these findings were carried out by the Radiological Department of the Central Chamber of Weights and Measures, Leningrad.

Science News Letter, August 19, 1933

PUBLIC HEALTH

Selenium Sprays Dangerous, U. S. Scientists Warn

KILLING insects with sprays containing the element selenium may have a dangerous aftermath for man, his livestock and his crops. Warning to investigate the poisonous possibilities of selenium sprays before using them is published in *Science* by three research workers of the U. S. Department of Agriculture, Dr. E. M. Nelson, Dr. Annie M. Hurd-Karrer and W. O. Robinson.

Selenium compounds that fall on the soil are absorbed by the plants, they state, and a particularly toxic compound is elaborated. Fifteen parts per million of selenium in the soil produces severe injury to the leaves of wheat plants, and a stunting of their growth. Quantities as small as one part per million do not prevent the plants from growing to maturity, but when grain or straw from such plants is fed to experimental ani-

mals it produces poisoning, retardation of growth, and finally death.

Selenium spray residues can be removed from fruits and vegetables by washing and the danger of direct poisoning to human beings thus eliminated. But the same plants can absorb the element from the parts of the spray that fall on the soil, and the kinds of poison they elaborate from it have no necessary relation to the poisonousness of the original spray material.

Furthermore, the three scientists add, there is evidence that selenium compounds may be reduced by soil organisms, so that spray residues ordinarily considered innocuous may be made available to the plant and be converted into highly toxic combinations.

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PHYSICS

Speed of Atom Hearts Too Great For Theory

CORES or hearts of the lightest chemical element, hydrogen, spin about on their axes at too great a rate. Drs. I. Esterman, R. Frisch and O. Stern of Hamburg University, Germany, have announced in a communication to *Nature* that ortho-hydrogen has a magnetic moment of 2.5 nuclear magnetons for each proton instead of one as demanded by the theory.

Nuclei, like electrons, are supposed to act as if they were attached to a minute gyroscope that spins at certain rates in such a way that the strengths of the magnetic fields due to spinning have certain integral values.

Since hydrogen is made of two atoms and each atom has its own spin, it is possible for the spins to either assist or oppose each other. One quarter of the molecules will possess no spin and three quarters will have twice the spin of an isolated hydrogen atom. The former variety of hydrogen is called para-hydrogen and the latter is called ortho-hydrogen.

By shooting hydrogen molecules, guided by their spinning hearts through an inhomogeneous external magnetic field and observing the deflection of the molecular beam, the German scientists were able to evaluate the strength of the gyroscopic action.

Elimination of the magnetic effect of the spinning of the whole molecule itself was accomplished by measuring the small deflection of the neutral para-hydrogen.

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IN SCIEN

ASTRONOMY

New Naval Observatory Telescope Near Completion

IN AN AIR-conditioned room at the U. S. Naval Observatory in Washington, kept constantly at a temperature of 75 degrees while the rest of Washington swelters, Prof. George W. Ritchey is now bringing to completion his work on the 40-inch mirror for the Observatory's new telescope. In another month, he estimates, it will be finished. Already the mechanical parts of the telescope, including the mounting and the drive to enable it to follow the motion of a star across the sky, and the dome to cover it, have been completed.

The new telescope is a reflector, in which a concave mirror focusses the rays of star light, and is especially adapted to photography. The mirror is being ground to special curves, developed by Prof. Ritchey and Prof. Henri Chrétien, a French optician, which it is claimed will give it many advantages over the older forms of telescope. It is the largest telescope of this type that has yet been built.

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PHYSIOLOGY

"Tail Center" Found In Brains of Monkeys

MONKEYS' tails have a special brain center to control them. Its location has been discovered by Dr. John F. Fulton and Prof. J. G. Dusser de Barenne of the Yale University School of Medicine, who have reported their researches to the *Journal of Cellular and Comparative Physiology*.

The "tail center" occupies a position in the brain above and slightly in front of the centers that control the hind legs. If it is injured on one side, the tail develops a one-sided weakness, which however passes off in two or three weeks. If the injury is over the whole tail-control area, the tail is paralyzed, so far as voluntary use is concerned, though it is still capable of convulsive involuntary grasping.

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CE FIELDS

PALEOBOTANY

Illinois Ice Age Forests Like Those of Canada

FORESTS of spruce, fir, pine and larch, like those of present-day Canada, stood in central Illinois during a part of the great Pleistocene ice age. Evidence to this effect has been gathered by John Voss of Peoria, Ill., and is presented in the *Botanical Gazette*.

Mr. Voss gathered samples of buried logs, leaves and other plant remains from thick peat deposits of known ice age date in three widely separated localities. When his material was identified in the laboratory, it proved to represent trees like those of the present forests of the North.

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MEDICINE

Study Condemns Chemical Treatment of Cancer

CANCER treatment by adjusting the content of various minerals in the blood is not justified on the basis of present positive knowledge. This is the general conclusion which may be based on a study of the role of sodium, potassium, calcium and magnesium in cancer, made by Dr. M. J. Shear of the U. S. Public Health Service, working in the laboratories of the Harvard Medical School.

In his investigation, which included a review of the work done by many other scientists as well as his own researches, Dr. Shear failed to find any relationship between the cancerous process and the amount of the four elements in the blood serum. He did find that there is more potassium and less calcium in young, actively growing tumors than in slowly growing or old tumors; but he feels that the data are insufficient to justify any generalizations.

Sodium seems to have no effect on the growth of tumors, potassium may have a stimulating effect, calcium may have a retarding effect, while magnesium does not seem to have the inhibitory effect that has been claimed for it. But here again the amount of dependable data is

too small to justify basing medical treatment on any of these conclusions.

Dr. Shear does not consider the use of the gland extract parathormone, to increase the calcium concentration in the blood, as justified because of the lack of evidence of any benefit to be gained from calcium increase. Similarly, he does not recommend the use of magnesium as a supposed cancer deterrent. And while the chemical relations of sodium and potassium to cancer growth are somewhat better known, he feels that much more laboratory investigation should be made before any of the findings can safely be used as bases for clinical procedure.

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ASTRONOMY

Companion To Dog Star Tests Relativity Theory

RELATIVITY is on the witness stand again just because the companion star to Sirius, the brightest star in the sky, has been found to be only one third as bright as previously thought.

The trouble that arises from this dimness is explained by Dr. A. N. Vyssotsky, University of Virginia astronomer, in a communication to the *Astrophysical Journal*. The size of a star is known from its brightness so the companion star must be much smaller than heretofore assumed. Thus bodies on its surface weigh less than before. Scientists are interested in the force of gravity on heavenly bodies for it is this force that produces the Einstein "red shift," which means that light coming from this star has had its frequency of vibration increased or its color reddened by a minute amount. The heavier the star, the redder the light.

Values of this red shift obtained by Dr. Walter S. Adams at the Mount Wilson Observatory are greater than can be accounted for from Dr. Vyssotsky's observations. This discrepancy between theory and experiment will be checked by further observations on both the brightness and the reddening of the light.

This little star has caused trouble in the past, for astronomers had to assume that it was made of something about 400 times heavier than gold. This trouble is partially overcome by Prof. Vyssotsky's observations which indicate that it is about 60 times as heavy as the densest object on earth.

Science News Letter, August 19, 1933

PHYSICS

Fastest Particles Most Easily Stopped

THE FASTER they go the easier they are stopped.

This is what happens to the newly discovered building blocks of matter, neutrons, Dr. T. W. Bonner of the Rice Institute, reports in a letter to the *Physical Review*. Neutrons are particles having a unit mass on the scale of an atom of oxygen weighing 16. Their most peculiar property is that they have no electrical charge as contrasted to other fundamental particles, and it is this fact that prevented their discovery until a year ago by Drs. Irene Curie and F. Joliot in France and Dr. J. Chadwick in England.

Two and one half inches of lead are necessary to stop less than one half of these corpuscles that travel with speeds up to 20,000 miles per second.

Strangely enough, it is the fastest ones yet known that are the most easily stopped by the lead. Dr. Bonner thinks that if still faster neutrons are obtainable they might be more penetrating than the present fastest particles.

Neutrons are produced by the bombardment of light elements such as beryllium and boron with the cores of helium atoms thrown out by radioactive changes in polonium.

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FORESTRY

Nation's Forest Resources To be Surveyed

PART OF the \$15,982,745 just allotted to the U. S. Forest Service from federal public works funds will be used for research. It is planned to make a nation-wide survey of the country's forest resources, to be financed from this fund.

Research will also be aided indirectly through the improvement of the experimental forests, which are the field laboratories of the forest experiment stations, and the improvement of equipment in the Forest Products Laboratory of the Forest Service.

It is not yet known just how great a share of the allotment will be applied in these ways. The principal part of the fund, however, will go for construction work and the control of insects destructive to timber and the control of the white pine blister rust.

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