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THE RELATIVITY THEORY AND THE ETHER DRIFT

THE Einstein theory of relativity must fall or at least require radical modification, if the experiments performed at Mt. Wilson, in California, by Professor Dayton C. Miller, of the Case School of Applied Science, are correct, is the opinion of Professor Albert Einstein himself, expressed in a communication from him to *Science Service*.

"If Dr. Miller's results should be confirmed," he says, "then the special relativity theory, and with the general theory in its present form, falls. Experiment is the supreme judge. Only the equivalence of inertia and weight remain, which would lead to an essentially different theory."

The Mt. Wilson experiments were intended to show the motion of the earth through the ether in space by which light and other radiations are supposed to be transmitted. When originally performed by Professor A. A. Michelson, now at the University of Chicago, and when repeated by Professor Miller at Cleveland, no appreciable result was obtained. When Professor Miller repeated it at Mt. Wilson, which is about a mile high, he obtained a marked effect, which seems to vary with the altitude.

According to Dr. Ludwik Silberstein, of the Eastman Kodak Company's Research Laboratory at Rochester, this indicated that the ether was dragged around by the earth at low altitudes, but drifted by at higher ones. According to Professor A. S. Eddington, of the University of Cambridge, England, such an effect would produce a difference in the position of stars as observed from sea level and mountain observatories, and no such difference has ever been observed. Dr. Silberstein answered this objection by the statement that the ether undergoes a peculiar kind of deformation, but Professor Einstein does not agree with him. He says:

"I can not share Dr. Silberstein's conception in case the experiments are correct. He means that with a theory of a deformible but fixed ether the known phenomena can be explained. This, however, is not so. A theory such as that is absolutely inconsistent with the positively proved astronomical aberrations. No theory exists outside of the theory of relativity and the similar Lorentz theory which, except for the Miller experiment, explains all the known phenomena up to date. Under these circumstances nothing remains but to await more complete publication of Miller's results. Then it is to be hoped that a correct decision will develop."

RADIOACTIVITY AND EARTHQUAKES

THE recent severe earthquakes felt in California and Montana and the mountain slide in Wyoming have aroused interest in the theory of Professor J. Joly, English geologist, on radioactivity as the possible cause of quakes. It is a well-known fact that throughout the entire earth's crust minute quantities of radioactive elements exist, mainly thorium and uranium, which are constantly producing heat by breaking down at a rate quite independent of the pressure and temperature found in the outer parts of the earth. The granites which are in the outer layer of the earth's crust contain approximately three times as much of these radioactive elements as the basaltic layer which is deeper, and this latter is twice as rich as the denser and more basic layer of peridotites.

Continents are essentially composed of granite embedded in a sub-stratum of basaltic composition. This has a lower melting point than the granite, and increases in volume about ten per cent. at its melting temperature. And since the basaltic layer is self-heating due to its radioactivity, Professor Joly states that it lacks only the latent heat of fusion to become fluid, and further, that at the present rate of disintegration it must again become fluid in about thirty million years. When this expansion has reached its greatest point the surface crust is correspondingly raised and increased in area about 650,000 square miles. The surface tension becomes so great that continents and ocean floors are split apart. Tidal action starts a slow westerly drift of the still solid continents and the superheated sub-stratum which originally lay beneath a continent now comes to lie beneath the ocean floor which melts away from below until the increasingly rapid loss of heat from the ocean checks and finally ends the process.

The reverse action now begins. Crystallization in the liquid basaltic layer takes place, the vastly increased land area contracts and settles down into the solidifying substratum and the margins of the continents especially are marked by intense compression, producing immense depressions and upheavals. This in brief is the cycle whereby the excessive heat due to radioactivity is accumulated and lost, during which succeeding cycles the ancient Eurasian ranges and the fairly recent Himalayas and Pacific ranges have been thrown up during the different geologic epochs. That such a cycle is nearing completion in the Pacific region is known, due to current observations on the steady sinking of the ocean floor and the regularity of the temblors, most of which are so slight as to be recorded only by the seismograph, but which occur regularly every ten or fifteen minutes.

THE RECORDING AND TRANSMISSION OF SOUND

A MAN sitting in an office in Berlin, Capetown or Pekin may soon be able to dictate a letter which will be heard and taken down instantly by a stenographer in an office in New York.

This is one of the startling results of an invention perfected in the laboratory of the Berlin Telegraphie Gesellschaft, Ltd., after secret experiments based on the researches of the Danish inventor Waldemar Poulsen. Briefly stated, the invention consists of a means of re-

cording and storing sounds on steel. The inventor, Dr. Kurt Stille, has been eighteen years at work on this question.

The sounds are recorded on a steel wire by electro-magnetic means, so that the wire bears no surface markings of any kind and can at will be "emptied" of its sound contents in readiness to receive others. The wire, which can be of any length desired, so that it may "take" the longest speeches or musical scores, can be connected with any telegraphic cable, which conveys the sounds further.

It is predicted that within a short time every newspaper correspondent in the world will be able to dictate his articles direct to his office. New music or operas or plays or statesmen's speeches will be heard simultaneously in all parts of the world without the rasping, noisy interference which at present interferes with purity of sound by wireless transmission.

One of the incidental effects, it is said, will be to drive the phonograph out of business. Even in the most perfect phonograph models, there is always a faint scratching sound as the needle travels over the vulcanite plate, which is completely eliminated by this new process.

In the machine turned out by Dr. Stille, the very thin steel wire revolves on two spools, deriving its current from a small electro-magneto; the sounds are conveyed by variations of the current. Pressing a button which induces another current "empties" the wire of its sound contents, which otherwise may be repeated at will and endure indefinitely.

The inventor describes the root principle of the invention in the following words: "We will suppose you want to dictate a letter. The sounds you utter are conveyed by means of a microphone and send waves through an electric current. This current flows through a small electro-magneto. The magnetic force becomes alternately weakened or strengthened according to what one might call the 'rhythm' of the electric current, which is of course based on the sound vibrations caused by the voice. This rhythmical magnetized electric current is communicated to the steel wire as it gradually winds out of one spool onto the other. When you cease speaking your words are recorded in invisible magnetic writing on the wire. To empty the wire of this writing is a very simple matter; one simply reverses the process and re-transforms the magnetic waves into ordinary sound-waves."

Instead of being "emptied" for further use, the charged wire may be disconnected and stored up, when it will, on being reconnected, repeat its sound contents as often as is desired. The life of such a sound wire, unlike that of a phonograph plate, is limitless.

EXPERIMENTS ON A CURE FOR SYPHILIS

WHAT may be a sensational new cure for syphilis was unfolded before the French Academy of Sciences by Dr. Roux, the director of the Pasteur Institute, when he related the experiments conducted by M. Lavatte, one of his assistants at the institute.

M. Lavatte has discovered a new chemical substance which he calls acetylozyamynaphenylynate; it is composed in part of arsenic and bismuth, in the respective percentages of 15 and 45.

When injected into the muscles of infected rabbits, this proved to have astonishing curative properties, small injections resulting in the symptoms of the disease disappearing within forty-eight hours, apart from sores, which took from four to five days to heal completely.

Two medical men, Drs. Fournier and Schwartz, tried this treatment on human patients. They selected thirty cases, in varying stages of the disease, which they treated with intramuscular injections of two cubic centimeters of the substance with the twenty-five-letter name.

One curious feature observed was the utter absence of any discomfort, of any painful reactions during the whole course of twelve of these injections. The therapeutic effects were startling, the main symptoms disappearing within a few hours after the first injection and the sore healing with great rapidity. The Bordet-Wassermann test, on being applied at the end of the series to each subject, gave in every single case a negative reaction.

Dr. Roux added the remarkable fact that in every case, the treatment appeared to have a tonic effect on the general health of the patients.

THE EARLIEST INHABITANTS OF AMERICA

ASIATICS in their long trek to the Americas reached Oregon during the ice age at least twenty-five thousand years ago, according to Dr. Edwin T. Hodge, professor of geology at the University of Oregon. These early migrants found the climate of that time equally hospitable and perhaps even more pleasant that that of the present time. The glaciers which occupied the crest of the Cascade Range were not due to low temperature, to change in direction of wind, nor to increased moisture content of the winds which then blew. These glaciers were due to mountains which then stood one thousand feet or more higher than they do now and as a result they robbed from the moist, warm westerly winds their moisture and their warmth.

The early presence of primitive explorers in Oregon during this period of warm, humid climate is shown by the discovery of fossils of a race of men who were antecedent to the Indians which the white man found here thousands of years later. These early men lived in the Willamette Valley in a "happy hunting ground" where mammoth, mastodon, giant sloth, camel and horse gave abundant animal food, where the river waters were stocked with fish, and where they roved among the sequoia, walnut, oak and willow forests.

Previous studies of the Pleistocene, or Ice Age, of British Columbia, Washington and Oregon have brought out two statements regarding the climate of that time.

They state that "the temperature gradually grew colder and finally culminated in the development of glaciers" and that a great sound occupying the Willamette Valley was developed at the close. This latter statement, if true, would likewise indicate a colder climate. The presence of a large body of water, in contrast to an equivalent land surface, reflects most of the light

energy received, its latent heat is high and evaporation from whatever cause results in cooling.

As a result of studies extended over the past eight years, Dr. Hodge has arrived at conclusions which materially differ from those hitherto published regarding geological events of the Pleistocene period of Oregon and Washington.

THE DISPOSITION OF THE AIRPLANE CHICAGO

THE fate of the most famous airplane in the history of aviation is before the War Department, and museum officials are eagerly and hopefully awaiting a decision. The plane is the *Chicago,* flagship of the 26,000 mile round the world flight of 1924. It represents one of the highest peaks of efficiency reached in aircraft construction, for it combined long distance endurance with the ability to withstand the heat of southern India and the bitter cold of the Arctic.

The *Chicago* is now stored away in the oblivion of a hangar at Dayton, Ohio, and the National Museum wrote to the War Department early last autumn requesting that it be transferred to the museum at Washington where it would be a part of the national collection of historic planes. A number of other museums have also asked for the plane. So far, the War Department has only announced that it favors exhibition of the *Chicago* in a prominent and fitting place.

The National Museum believes that it has a strong claim to the *Chicago* because by law the museum is the depository of scientific and technical apparatus no longer useful to the government. The museum now has one of the largest collections of historic aircraft in existence.

A national collection has been in progress for some time, and we now have thirty planes, almost all of which are original, says Paul E. Garber, assistant curator, in charge of aeronautics, at the National Museum. Among the historic planes on exhibition is the Alaskan flag plane of the squadron which in 1920 flew from New York to Nome and back, making the 9,000 miles in 112 hours flight time. One part of the trip which takes 30 days by dog team was made by plane in an hour and a half.

Another important plane in the government collection is the T2, which was remodeled by Anthony Fokker in Holland for long distance flight. When tested it broke all previous records for remaining in the air, and crossed the continent without stopping in 1923.

Mr. Garber points out that the importance of the early planes that made history has been fully realized only in the past few years but such exhibits are now in great demand by museums. The Hargrave ornithopter, a wing flapping machine of 1898, which flew 312 feet propelled by compressed air, is an example of these old historic planes and is now in the National Museum.

The famous NC4, the first plane to succeed in crossing the Atlantic, has been offered to the government, but it is so big that the museum has no place at present to exhibit it.

ITEMS

THE scientists who went to Dayton to aid the counsel for John T. Scopes in defending the freedom of teaching and the facts of evolution are sponsoring the raising of a scholarship fund that will enable Mr. Scopes to continue his education at some graduate school of his own choosing. "It is Mr. Scopes's desire to undertake graduate work in some branch of natural science," says a statement announcing the plans. "At present, however, he is without a teaching position or other means of obtaining the necessary money. Although he has been offered numerous lucrative lecture and stage engagements which would net him many thousands of dollars, he has refused them, wishing to avoid even the appearance of self-exploitation. Impressed with Mr. Scopes's intellectual qualities and modesty, and believing that he is entitled to some substantial recognition for the trying experiences that he has undergone in the service of science, and of liberty of thought and speech generally, the scientists who were associated with the defense have organized a committee to raise a scholarship fund of $5,000 to enable Mr. Scopes to undertake graduate work at an institution of higher learning of his own choosing during the next few years." Dr. Maynard M. Metcalf, of Oberlin College and the Johns Hopkins University, the first scientist to testify in Mr. Scopes's behalf, has consented to act as chairman of the scholarship fund committee; Dr. Kirtley F. Mather, of Harvard Geological Museum, Cambridge, Mass., is vice-chairman, and Watson Davis, managing editor of *Science Service,* Washington, D. C., will act as secretary-treasurer.

A NEW form of sun-dial that tells time to within thirty seconds on an ordinary clock face, has been received by F. Hope-Jones, chairman of the British Horological Institute, from the inventor, Dr. W. E. Cooke, government astronomer of Sydney, Australia, and is described by Mr. Hope-Jones in the magazine *Nature.* It consists of a ring which can move on pivots placed in a north and south plane, the position of the gnomon of the usual sun-dial. On one side of the ring is a small hole which, when the sun is shining, and the instrument is in use, casts a small spot of light on a figure-8-curve on the opposite side. This curve is marked with the date for various times of the year, and allows for the "equation of time" or the amount that the sun is ahead or behind its average position. To use it, the ring is turned until the spot of light is on the proper part of the curve, and the hands, which are geared to it, then indicate the correct time.

THERE is no getting away from bacteria for there are at least 30,001 on each kernel of fresh corn, 30,000 ordinary ones that are easily killed, and one "thermophile," or heat resisting organism not afraid to boil, according to experiments conducted in a canning plant for the U. S. Bureau of Chemistry by Lawrence H. James, government bacteriologist. Fresh hand husked corn has at least four times as many bacteria on it as machine husked, and these increase about fifteen times when the corn is cut and passed through sifting screens. However, after the corn was packed in brine and preheated to 185 degrees in the sterilization process, only one per cent. of the ordinary bacteria remained alive and ten per cent. of the more stubborn ones.