SCIENCE NEWS

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THE ECLIPSE OF MAY 9

PRACTICALLY perfect weather rewarded the astronomers who journeyed to Iloilo, P. I., from the United States, England and Germany to observe the eclipse of the sun on May 9. The result was that all the parties carried out their observations as planned, and secured some excellent pictures of the corona, outermost layer of the sun, that can only be observed at eclipse time.

The largest camera, 62 feet long, used by the party from the U. S. Naval Observatory, made 13 separate exposures of different lengths. With the other smaller cameras, 46 exposures were made, so it is improbable that anything of great importance has escaped recording.

Motion-pictures of the eclipse, as the dark moon gradually swallowed the sun, and the corona finally flashed out, were also made by the Navy astronomers, from the neighboring province of Antique. Photographs were also made from two airplanes.

Dr. R. L. Waterfield, English astronomer and leader of the Waterfield-Lloyd eclipse expedition, was located about a mile north of the naval party. He also carried out his observational program according to schedule.

The sky was covered at the time of totality with a very thin veil of high cirrus clouds, which did not interfere with the observations. The corona of the sun extended about an equal distance on all sides, except for one long streamer. This projected to the right and upwards for a distance of about twice the sun's diameter. Such a round corona is characteristic of the time of maximum sun-spots, which has just passed.

From Alor Star, Kedah, it is reported that Harvard University's expedition, under the leadership of Dr. Harlan T. Stetson, was successful. Some high cirrus clouds covered the sun at the time, but were too thin to be a serious disadvantage. The work was confined to measurements of the brightness of the eclipse. Dr. Stetson announced that the intensity of the corona's light is approximately fifteen hundredths of a foot-candle.

FUTURE SOLAR ECLIPSES

THE next total eclipse of the sun happens on April 28, 1930, and will be visible in California, along a line crossing the state from southwest to northeast and entering just north of San Francisco. However, despite the accessibility of this eclipse, probably no elaborate astronomical expeditions will be equipped to observe it. It only lasts a second or two, a period much too brief to permit many useful observations. Farther westward, in the Pacific Ocean, and eastward, in Canada, this eclipse will be seen, but not as total. There it will be annular, which means that the bright rim of the solar disc will appear all around the dark moon. This eclipse will be of a very peculiar type, known as a central eclipse, which starts out annular, becomes total in the middle of its path, then ends as an annular again.

Later in the year comes another total eclipse that offers much better astronomical conditions, but which may not be observed either, because of its inaccessibility. This will occur on October 21, along a path crossing the south Pacific from the north of New Guinea to southern Chile.

Unfortunately, its path completely misses land, with the exception of two small islands. One, Nurakita, in the Ellice group, is almost completely inaccessible. The other is Niuafou, about 280 miles from Apia and 425 miles from Suva, belonging to the principality of Tonga. Here the conditions are only a little better, for a steamer only passes once a month, and does not ordinarily stop. Mail is sealed in a tin can thrown overboard and a native swims out and gets it. There are no docks, and when a steamer does stop, a landing must be made through the surf. As it would be very difficult to land instruments in this way, it will probably not be very popular. The U. S. Naval Observatory has funds available for an expedition to Niuafou, but it is doubtful whether they will be used.

It is on August 31, 1932, that the next really satisfactory eclipse is scheduled, in eastern Canada and New England. The path will be about a hundred miles wide, with its southern limit along a line from Montreal to Salem, Massachusetts. Mt. Washington, in the heart of the New Hampshire vacation grounds, is right in the center of the path.

The August, 1932, eclipse will be much more favorable than the one of 1925, for it will last longer, the chances of clear weather will be much better and the sun will be higher in the sky. The meeting of the International Astronomical Union, which would otherwise be held in 1931, has been postponed to September, 1932, in some eastern city, so that the astronomers will have a double attraction.

MEASUREMENTS OF THE VELOCITY OF LIGHT

REFLECTING a beam of light back and forth ten times through a pipe a mile long, from which the air has been exhausted, is the experiment soon to be undertaken by Professor A. A. Michelson, of the University of Chicago. Professor Michelson left Chicago recently for Pasadena, California, where the experiment will be performed in order to check more closey the speed of light.

His interest in the speed of light began forty-six years ago, while he was an instructor at the U. S. Naval Academy at Annapolis. Two years ago he completed a series of experiments along the same line which involved sending a beam of light from Mount Wilson to a neighboring peak and back. These experiments showed that light travels 186,284 miles every second, and gave the most accurate figure for it that has ever been obtained.

But Professor Michelson is still not entirely satisfied. In a second, a beam of light might travel as much as a quarter of a mile more or less than 186,284 miles. Close

as this is, he thinks that he can get it still closer, and so he will not be satisfied until he has done so.

One possible way of getting increased accuracy is to increase the length of the path over which the light has to travel. Last year he tried to send the light from Mount Wilson to a peak about a hundred miles away and back, but found that the air was not clear enough to get a satisfactory image. And determinations in open air, of this kind, involve such factors as temperature, air pressure and humidity. These may vary slightly in a long path, and even though corrections are made for them they introduce uncertainties.

By putting the light beam in a vacuum, these troublesome factors can be eliminated. Another advantage will be that he can personally measure the length of the light path in the pipe. In the mountain experiments, the U. S. Coast and Geodetic Survey measured the distance between the peaks with an accuracy of one part in a million. Though he does not question the accuracy of their survey, he wants to be able to check all the factors personally. With the use of the pipe he can do this with a steel tape to a very high degree of precision.

"I am well satisfied with the accuracy of the present figures of the speed of light," said Professor Michelson as he paused from the preparations for his trip, "but the vacuum may enable a further correction of one or two parts in a million, and at any event, will serve as a check on the previous method."

Professor Michelson said that he may also make another repetition of the famous Michelson-Morley experiment, the failure of which, when performed in 1887, to show the earth's supposed motion through the ether, finally led to the theory of relativity. Last year he repeated it in Pasadena, and still failed to get any appreciable effect, but now he may repeat it again on Mount Wilson. In this way, he can check a possible effect of altitude.

STATIC MEASUREMENTS FOR WARNINGS OF STORMS

TROUBLESOME as static is to the radio listener, it may be of use in predicting weather by giving warnings of approaching storms, S. W. Dean, of the Department of Development and Research of the American Telephone and Telegraph Company, told members of the Institute of Radio Engineers meeting in Washington on May 15.

Experiments made at Houlton, Maine, where the trans-Atlantic telephone messages from Europe are received, showed that a storm could be located several days before it arrived.

Mr. Dean spoke of the case of a storm which first gave evidence of its existence on September 7, 1928, when it was somewhere northwest of the Great Lakes, at a bearing of 420 degrees from Houlton. Each day thereafter they broadcast its progress in the form of static. Every time measurements were made at Houlton, this center of static was indicated in the direction of the storm. On September 13, it passed in the vicinity of Houlton and was accompanied by unusually frequent lightning. On that day the observation showed static from all directions as if the storm completely surrounded the town. The next day, the disturbance went out to sea to the southeast and evidence of the storm at sea persisted for several days afterwards.

Though these experiments only located the storm along a line in a certain direction from Houlton, observations from two distant points would have permitted an exact location of it where the line crossed.

"It has been possible to correlate the observations with weather conditions in the vast majority of cases, excepting, of course, those occasions when the sources of atmospherics were in regions not covered by available weather data," said Mr. Dean. "In many cases the directions from which atmospherics came coincided with the bearings from Houlton of places where thunderstorms were reported. In many others the sources of atmospherics were apparently low-pressure areas where thunderstorms may have occurred, though none was observed at Weather Bureau stations. We are inclined to believe from these results as well as from the work of others, that most atmospherics are due to lightning discharges, although, of course, the evidence is too incomplete to permit us to draw positive conclusions."

COLOR IN THE MOVIES

TINTED motion-picture films, with red for fire scenes, blue for night scenes, green for forest scenes or yellow where artificial light is represented, will now return to the theaters, from which they were forced for technical reasons with the advent of the talkies.

This is made possible with a new series of films announced at the meeting of the Society of Motion-picture Engineers at the Bell Telephone Laboratories on May 7. Dr. L. A. Jones, head of the physics department of the Eastman Kodak Laboratories, under whose direction the tinted film was developed, described their advantages.

Before the days of the talkies, the familiar tinted films were obtained by printing on tinted stock, furnished by the various film manufacturers. This was like the ordinary positive film on which the pictures were printed, except that in its manufacture a dye had been incorporated into the celluloid base.

Most of the sound or talking movies to-day are produced with the sound record on a strip alongside the individual picture frames which carry the visual record. This strip varies in transparency. A beam of light passes through it as it runs through the projector, and thence to a photoelectric cell, which converts the variations of light to variations in electric current. This current is amplified, and operates loud speakers, where it is converted to sound.

Just as photographic plates are very sensitive to blue or violet light, and very insensitive to red light, for which reason a red light is used in their development, the photoelectric cell is also most sensitive to blue-violet light. Thus, when red tinted film was used, the color of the film prevented the light getting through to the cell. Yellow stock, though it did not absorb as much of the active light rays, also absorbed some of them, and even the blue film was not exactly the right color for the maximum sensitivity.

Sixteen separate tints have now been developed, running the entire range of the spectrum. A seventeenth is without color, but imparts a silvery hue to the picture. The peculiar thing about these new colors, however, is that while they appear blue, green, yellow, etc., to the eye, each of them contains some blue-violet as well, and so transmits the color required for the photoelectric cell. Dr. Jones demonstrated this by superimposing pieces of the film of the different tints on each other in piles of six or eight. No matter what combinations were used, blue-violet light penetrated in every case, showing that they were all transparent to this color.

According to Dr. Jones, the use of these tints will aid the movies in arousing the desired emotional moods of the audience. With the use of tints the actual lighting of outdoor or indoor scenes can be stimulated, and there is added realism, even though the color is a solid one over all parts of the picture, and not true color photography, where each object has its proper color. The person seeing such a tint tends to associate it with one of the main parts of the picture. Thus green, for a forest scene, suggests young foliage, grass, gardens, etc., but it may also be used in quite different scenes to suggest the freshness of youth.

RADIUM EFFECTS AND COSMIC RAYS

WHATEVER it is that makes radium, and related elements, disintegrate and give off the rays that are so helpful both to the physicist and the physician, the cosmic rays are not responsible. This has been found by Dr. Louis R. Maxwell, National Research fellow working at the Bartol Research Laboratory of the Franklin Institute. He will report his latest researches in the forthcoming issue of the institute's journal.

Shortly after the discovery of radium and its effects, over thirty years ago, the suggestion was made that some highly penetrating rays bombarded the earth from space, and were absorbed by certain elements. This energy, it was thought, might break up the radium atoms, and be given off again as rays of longer wave-length.

The eventual discovery of such highly penetrating rays, which have been particularly studied by Dr. R. A. Millikan, of the California Institute of Technology, brought a renewal of interest in this theory. Though these rays from space are highly penetrating, they are completely stopped by a thickness of 225 feet of water, or equivalent amounts of other materials.

Dr. Maxwell took some polonium, another element in the radium series, and measured the rate at which it disintegrated on the surface of the ground, and in a mine 1,150 feet below the surface. The mine contained a large quantity of a zinc ore, willemite, which is more absorbent of the rays than water. At the depth at which the experiment was performed, the material above absorbed as much as 400 feet of lead, or more than half a mile of water, so that it was certain that no cosmic rays could reach the instruments.

Despite this, the rate of decay of the polonium was almost exactly the same whether the experiment was done on the ground or in the mine, and thus Dr. Maxwell concludes that there is no appreciable effect of cosmic rays on radioactivity.

As a matter of fact, his calculations show that it is unreasonable to expect any such effect. Only once in some 20,000,000 years would a cosmic ray be absorbed by a polonium atom, in the apparatus, so feeble are the rays. This would make it entirely impossible to measure the effect of the absorption of a ray by an atom, and also shows that the vastly more frequent breakup of the polonium atoms can not be due to such an absorption.

Even if the cosmic ray is something like a bullet, and merely has to pass near a polonium atom to break it, they can not be held responsible. With the size of the polonium plate used, only two cosmic rays would reach it every second, while 3,000 atoms of polonium in it disintegrate every second. Thus less than a tenth of one per cent. of the disintegration could be blamed on the cosmic rays.

ITEMS

THE tornadoes of 1929 and the loss of life caused by them during the first four months of the year are well above the average. So far figures compiled tentatively by the U. S. Weather Bureau show that 60 to 80 tornadoes have occurred and that the death lists have numbered 250 to 280. Somewhat unusual are the ways in which the tornadoes have grouped themselves. The storm that swept northwestward during the latter part of the week (May 1 to 4) left in its wake a succession of débris and dead due to whirling masses of air in Arkansas, Tennessee, Virginia, Maryland and Pennsylvania. Fortunately the loss of life was not as high as the toll of 80 taken by the St. Louis storm of September, 1927, which the weather experts rate as the most recent major tornado judged from the loss of life. Last year was notable because of the large number of tornadoes and the low loss of life. Already the death toll of this year exceeds the 1928 record of 78, but the 1928 total of 180 tornadoes may not be exceeded this year.

A REVOLVING drum only ten inches in diameter may replace a revolving disc six feet in diameter to give television pictures, according to a description given to the Institute of Radio Engineers by C. Francis Jenkins. Most of the methods of television used up to the present employ a scanning disc, around the edge of which is a spiral row of holes. In order to get a large picture, the disc must be made very large. As the holes move across a flashing neon lamp, the image of the original picture is reconstructed. The new scanner described by Mr. Jenkins consists of a hollow drum around the outside of which is a spiral row of holes. At the center of the axis of this revolving drum is a small neon lamp and a row of quartz rods extending from each hole to the center. These carry the light from the neon lamp to the holes so that a picture four inches square may be obtained with a ten-inch drum. This can be magnified to about ten inches square so that from twelve to fifteen people can watch it.