

Moon's Shadow at Eclipse Photographed

Astronomy

Fleeting Darkness on Earth Recorded From Airplanes

CLOUDS over the sun broke away at Camptonville, Yuba County, California, two minutes before the total phase of the solar eclipse of the sun. Only the lightest haze remained and the observations planned by the various expeditions located there were carried through successfully.

The Lick Observatory-Crocker expedition under the direction of Dr. J. H. Moore secured photographs of the spectrum of the solar atmosphere with two powerful spectographs fitted with plate holders moved by accurately tuned screens driven by motors to secure perfectly uniform speed. One spectograph recorded the spectrum in the violet-blue region from 3900 to 4650 Angstrom Units; the other, the spectrum in the orange-red region from 4861 to 6563 Angstrom Units. Both plates when developed proved to be in perfect focus. It will, of course, require months of careful study to interpret them fully.

Although the shadow which passed was only about three thousand feet wide and was supposed to be subject to a possible error of nearly fifteen hundred feet, the photograph of the corona taken with three cameras, one at the center, one near the northwest, and one near the southeast edge of the computed path, show that the actual path agreed closely with the predicted one as corrected by the latest computations. Since the duration of the totality was but one second these photographs of course give but little indications of the form of the corona. The times of second and third contact were accurately recorded with the aid of a short wave-length receiving set and a chronograph, thanks to the cooperation of the officials at the Naval Observatory at Mare Island who sent out a special set of signals.

A novel method of measuring the breadth of the shadow path consisted in stationing boy scouts at intervals of one hundred feet in a line at right angles and extending well beyond its possible boundaries. Each scout was to report whether or not the sun disappeared entirely for an instant.

In the immediate neighborhood of the Lick Observatory party Dr. R. L. Waterfield, an English amateur now connected with Johns Hopkins University, had set up a grating spectrograph designed to secure records of

the ultraviolet and also of the extreme infra-red regions of the spectrum of the solar atmosphere. He reports successful results.

A novel installation was that of Weld Arnold of the American Geo-

The total solar eclipse of April 28, like all such astronomical exhibitions of recent years, attracted to the narrow path of the moon's shadow many astronomers and laymen eager to witness the infrequent spectacle. The results of their observations are told in the accounts on this page.

The cover photograph shows, at the right, Dr. Hamilton M. Jeffers of Lick Observatory with the camera he used to photograph the moon's shadow on the ground from an altitude of ten thousand feet, and Lieut. E. B. Bobzien who piloted the Army airplane.

graphical Society, New York. He had two moving picture cameras on a single mounting so adjusted that one photographed the dial of a watch while the other synchronously photographed the narrowing crescent of the sun before totality and the growing crescent for a short time afterwards. This record should be the most accurate one of the instants of contact.

A number of amateur astronomers and moving picture companies were in a field making records of the eclipse.

In addition airplanes were brought into service successfully. The Army Air Service at Crissey Field, San Francisco, cooperated with the Lick Observatory by sending up two planes above the Napa Valley to an altitude of over ten thousand feet. An airplane carried Dr. H. M. Jeffers of the Lick Observatory equipped with a camera of two inches aperture and three and six-tenths inches focal length. The other carried army photographer Sergt. S. T. Bush, provided with a special camera. The weather was fine in that part of the state and Dr. Jeffers succeeded in photographing the moon's shadow as it swept over the ground beneath. This has never before been done. Sergt. Bush got good photographs of the sun.

The Pomona College Expedition, under the leadership of Prof. Frank P. Brackett, was stationed four miles southwest of the Lick Observatory parties and was equipped to carry out a similar program. He reports complete success. Two airplanes cooperated with Prof. Brackett.

This eclipse was unique in being the shortest one ever observed successfully and also in the great variety of observations secured.

Bailey's Beads

By Dr. Seth B. Nicholson

In charge Mt. Wilson Observatory Eclipse Expedition.

Bailey's beads were the most conspicuous feature of the sun's eclipse as seen from our location twelve miles from Doyle, Calif. They showed all around the sun during the whole of the time of totality.

A few minutes before the critical time of totality clouds that masked the sun blew past and a clear view was obtained. But more clouds came and at totality the sun was covered by thin clouds. Our photographs will not have much scientific value as far as photometric measures are concerned but some of the spectrographs may give results.

The corona was not visible on account of the clouds. We did, however, observe shadow bands upon the earth's surface. Our observations showed that the predicted time of the eclipse was correct to within two seconds at least.

The party of the U. S. Naval Observatory was busy with observations about a half mile away and two Navy airplanes were flying at eclipse time. The Navy pilots reported the clouds twelve thousand feet high and one flew at eighteen thousand feet.

Sunday was completely cloudy but our hopes for good weather were raised when it cleared that night. Monday dawned heavily clouded and it rained a little. At the time of first contact the sun was barely visible. Considering the cloudy weather of last week we were fortunate to get the view of the eclipse that we did.

Clouds

By Dr. Heber D. Curtis

Leader of Allegheny Observatory Expedition.

Thick clouds prevented the Allegheny Observatory expedition from making any eclipse observations from its station at Gerlach, Nev. Not a plate was exposed. (Turn to page 287)

NATURE RAMBLINGS

By Frank Thone



Bloodroot

A GOOD theme for a botanist-poet might be supplied by the bloodroot, that now stars our woods. Such a one might well hail the little white flower as a "modest poppy" that

"Crowds back its carmine blushes to its root

And turns toward all ardors of the sun

A front demure and white as any nun."

For the bloodroot is really a close cousin of the poppy, and the red that its relative flaunts in its face, this little white spring blossom expresses only in its blood-red sap. It would not be exactly correct, however, to say that the red sap is found in its root, for the thick underground part of the plant is really a rhizome or subterranean stem, from which the true roots, as well as the overground stems, take their rise.

The sap is somewhat thick and milky under its red color, which is another point of kinship with the milky-juiced poppy tribe. And as the juice of the poppy contains a poisonous principle used in medicine, so also does the juice of the bloodroot. Under the Latin name "Sanguinaria" the dried rhizome used to find a more or less prominent place on druggists' shelves; though it is little used now.

The bloodroot is one of the small number of native American wildflowers that needs little warning against reckless bouquet-gathering, due again to that same thick, red, rather irritating juice. Children picking flowers in the woods sometimes take a handful of its attractive, though short-lived, white flowers; but the appearance of their hands and dresses usually causes their alarmed mothers to place further bloodroot gathering under interdict.

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Roentgen's Rays—Continued

spot—namely, from that which is the new terminus of the cathode rays.

For this reason, therefore, the X-rays, which it is impossible to deflect, cannot be cathode rays simply transmitted or reflected without change by the glass wall. The greater density of the gas outside of the discharge-tube certainly cannot account for the great difference in the deflection, according to Lenard.

I therefore reach the conclusion that the X-rays are not identical with the cathode rays, but they are produced by the cathode rays at the glass wall of the discharge-apparatus.

13. This production does not take place in glass alone, but, as I have been able to observe in an apparatus closed by a plate of aluminium 2 millimetres thick, in this metal also. Other substances are to be examined later.

14. The justification for calling by the name "rays" the agent which pro-

ceeds from the wall of the discharge-apparatus I derive in part from the entirely regular formation of shadows, which are seen when more or less transparent bodies are brought between the apparatus and the fluorescent screen (or the photographic plate).

I have observed, and in part photographed, many shadow-pictures of this kind, the production of which has a particular charm. I possess, for instance, photographs of the shadow of the profile of a door which separates the rooms in which, on one side, the discharge-apparatus was placed, on the other the photographic plate; the shadow of the bones of the hand; the shadow of a covered wire wrapped on a wooden spool; of a set of weights enclosed in a box; of a galvanometer in which the magnetic needle is entirely enclosed by metal; of a piece of metal whose lack of homogeneity becomes noticeable by means of the X-rays, etc.

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Eclipse—Continued

Shadow Movies

Observations made by Mrs. Isabel M. Lewis, astronomer of the U. S. Naval Observatory, at Honey Lake, California, were successful. Bailey's beads but no corona was observed and it was determined that the path was correct as predicted and the time was right to within two seconds. U. S. Navy airplanes operating for the U. S. Naval Observatory secured one reel of motion pictures of the shadow from an elevation of eighteen thousand feet and from the ground Navy photographers made a reel of the eclipsed sun.

Best Prediction

The solar eclipse of April 28 upon the basis of preliminary reports has been proclaimed the most accurately predicted eclipse of record. Due to the very short totality and consequent narrow path, it was necessary to take into account the latest observations of the moon's position in making the final determination of the area from which the totally darkened sun could be seen.

The prediction made by James Robertson, director of the Nautical Almanac office of the U. S. Naval Observatory was fulfilled with greater accuracy than was to be expected.

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