

THE SOLAR ECLIPSE OF APRIL 17.

The Annular Eclipse as Observed near Chavenay, France.

THE recent eclipse of the sun was of interest from several points of view, but chiefly in the opportunity it afforded of determining the

McClellan and Mr. W. N. McClellan, and myself, for it is possible that these observations, combined with those made by other observers, may help to locate the exact path of the moon's shadow as it swept across the country, and so determine the differences between the observed and the numerous calculated tracks.

We arrived at Paris in the early morning of the eclipse day (17th), and decided to take up our position on a portion of the track which would possibly be less frequented by other observers. We had heard that the region about Saint Germain-en-Laye, a point easily reached by train from Paris, would be fully occupied, so we determined to intercept the track more to the south-westward.

The accompanying chart (Fig. 1) shows the region to the north-west of Paris, with Saint Germain-en-Laye near the centre. The several lines lying in the direction south-west to north-east are the positions of the tracks of the shadow in that region as given by the various authorities. Thus, commencing with the upper one and working downwards, they represent the positions as given by (1) the "Berliner Jahrbuch," (2) "Nautical Almanac," (3) Dr. Crommelin, (4) "American Ephemeris," (5) "Connaissance des Temps," and (6) "Carte du Bureau des Longitudes." This chart is a portion of a much larger chart published recently in

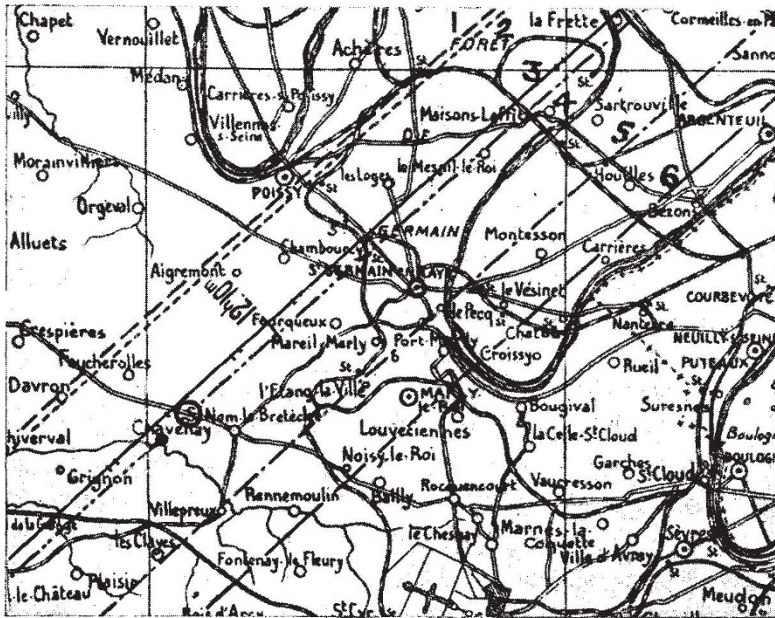


FIG. 1.—The region to the north-west of Paris, showing the several computed lines for the central eclipse from (1) "Berliner Jahrbuch," (2) "Nautical Almanac," (3) Dr. Crommelin, (4) "American Ephemeris," (5) "Connaissance des Temps," (6) "Carte du Bureau des Longitudes."

exact path of the moon's shadow and the duration of totality. It was well known that there existed a great deal of uncertainty as to both these items, the calculations depending on the different values employed.

It was generally considered fairly certain that the total phase would be observed from stations near the north of Portugal and Spain, and that totality would only last for a second or two at most if the correct position were selected.

It was my intention to have proceeded on April 5 to Ovar, in Portugal, and place myself as near the centre of the track as possible, relying on the calculations of Dr. Crommelin, but unfortunately unforeseen circumstances rendered it impossible for me to undertake the journey. I was enabled, however, at a later date (16th) to go to Paris and observe the annular phase from a station some miles outside that capital.

The present communication deals with the observations made by my companions, Mr. Frank

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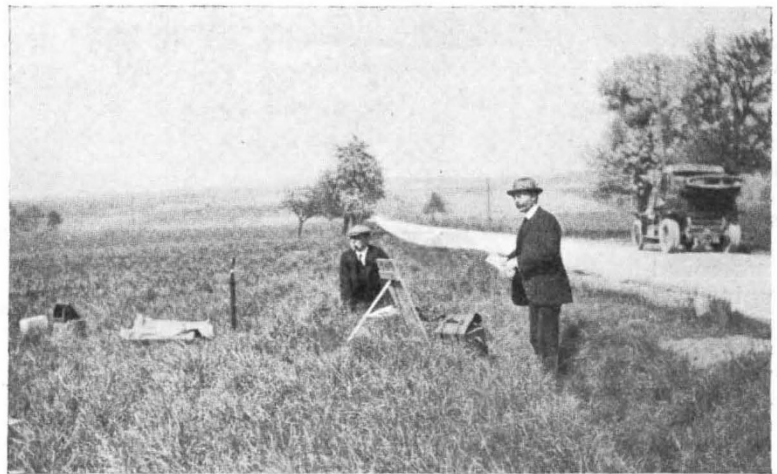


FIG. 2.—The main road (looking westward) from which we made our observations.

L'Astronomie, but here the track calculated by Dr. Crommelin has been indicated.

Being unaware of the position of Dr. Crommelin's line, we decided to place ourselves on that

indicated by the "American Ephemeris." A motor-car made it possible easily to reach the spot we selected, which lay on a part of a main road about three-quarters of a mile to the north-east of the village of Chavenay. This village is marked with a black disc in Fig. 1, and our camp is shown by a black circle near it.

The locality in which we settled was rather high, in slightly undulating country and very open, so that we had a good view for miles in all directions. The accompanying photograph (Fig. 2) shows the country looking westward along the main road.

We had this region all to ourselves, for only four other persons were within a quarter of a mile of us on either side of our position.

The weather was all that could be desired, only very small patches of cloud moving lazily in the sky.

After first contact had taken place at about 10h. 48m. (the times mentioned are only approximate), we gave ourselves up to noting any peculiarities that might be worth recording. There was scarcely a breath of wind, and a balloon which was silently making captive ascents at about a mile from us appeared to go vertically up and down. A little later we experienced some small intermittent breezes from the south.

Numerous skylarks were singing merrily above and around us, and twice the whirr of the Gnome engine was heard when a biplane and monoplane came over in our direction from the south. Two hawks were soaring leisurely in the sky in our vicinity, and one went off south-eastward and seemed to try to outvie the captive balloon, which was then quite still at its greatest altitude.

As the sunlight grew appreciably more feeble and everything began to take on that weird, ashen hue so typical of eclipses, the skylarks were hushed and a few birds flew by as if homeward bound. This was at about five minutes past twelve, or about five minutes before the maximum phase.

Observing with a pair of binoculars (magnifying NO. 2218, VOL. 89]

2.5 times) shielded with dark glasses fixed to the front of the objectives, I watched the progress of the moon over the sun.

At first the crescent sun had been growing less and less in length, but at a later stage, as second contact was approaching, the thin remaining crescent began to lengthen out, at first slowly and then more rapidly.

Just beyond the end of the horn of the crescent in the south-eastern quadrant I observed the summit of a prominence (orientation about 8 o'clock), quite isolated, and I called to the others to notice it. The further movement of the moon allowed more of it to be brought into view, and the well-known "Baily's beads" had already begun to be clearly observed along the limb,

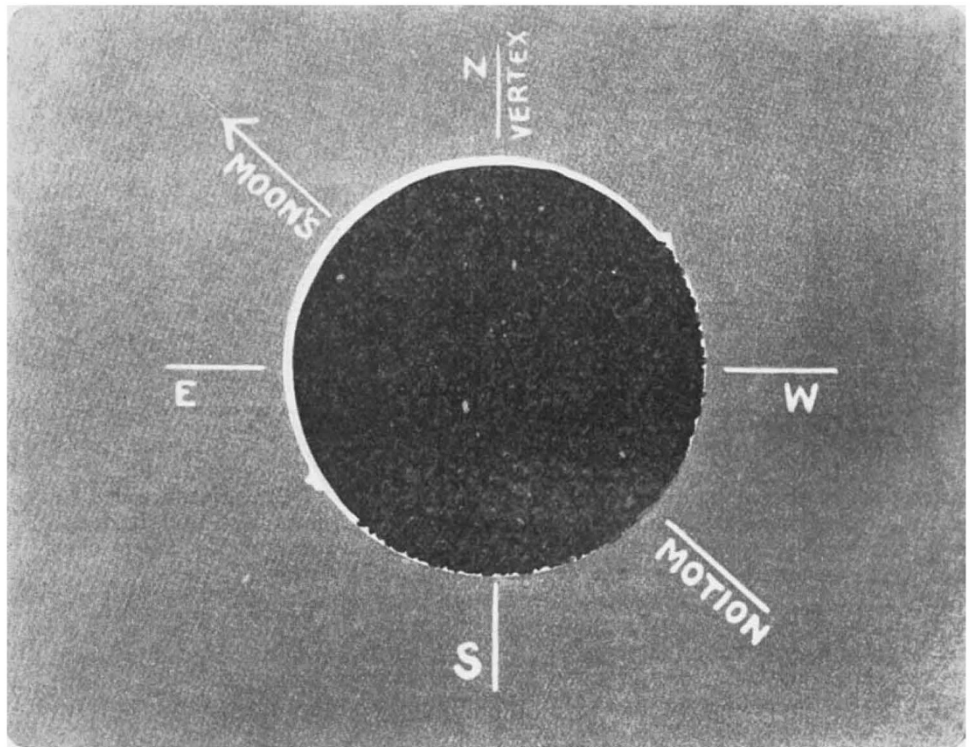


FIG. 3.—The eclipse as observed just before the beginning of the annular phase.

successively forming in an anti-clockwise direction.

Almost simultaneously with the above appearance a like phenomenon was happening in the north-western quadrant. The "beads" were forming there in a clockwise direction, and a prominence also became visible (orientation about 2 o'clock), though of smaller dimensions (radially) than that seen in the other quadrant.

The successive formation of the "beads" in *both quadrants* reminded me vividly of the electric night sky-signs in London, when numerous nearly adjacent small incandescent lamps are successively lighted up.

So far as I could see, the phenomenon was symmetrical in both quadrants, neither quadrant

predominating in intensity. Both these sets of strings of "beads" travelled, or rather were successively formed, until they almost met in the middle of the limb in the south-west quadrant.

Unfortunately I could not observe any longer, as I had previously arranged at this stage to move a lever on my Thorp grating camera to expose a plate for one second; thus my attention had to be turned to the instrument. When I looked up again, about two seconds afterwards, the sunlight had just begun to break out in the south-western quadrant.

The accompanying sketch (Fig. 3) illustrates approximately the conditions I observed just previous to the beginning of the annular phase. The impression I gained was that the eclipse, from our point of observation, *must have been very nearly if not actually central.*

Mr. Frank McClean, who was likewise observing, also concluded that the eclipse was central; he recorded prominences at about 9, 1, and 7.30 o'clock, and estimated the duration as two or three seconds.

Mr. W. N. McClean observed two prominences, one at 8 o'clock and the other at half-past one, and both were visible, according to him, "some time before Baily's beads flashed out round the dark arc." The eclipse "appeared to be quite central, and the duration of darkness about two seconds."

Our attention being fixed on the immediate region of the sun, no observations were made of stars, planets, shadow-bands, or such like phenomena.

Since my return to London, Dr. Crommelin kindly communicated to me the position of his predicted line of central eclipse, and this I have inserted in Fig. 1. This line, it will be seen, lies a little to the north of that representing the American prediction. Dr. Crommelin saw the eclipse well from a station on the road from St. Germain-en-Laye, just north-west of the railway crossing, and in the above mentioned communication he says, "But from the actual result I think that the true line was nearer the 'American Ephemeris' line than my line."

WILLIAM J. S. LOCKYER.

French Observations of the Eclipse.

In the *Comptes rendus* for April 22 (No. 17) there are seventeen papers giving accounts of the observations made, chiefly by French observers, during the eclipse of the sun which took place on April 17, but in the following notes we can only refer to some of the more important results.

M. Deslandres organised a very complete set of observations at Meudon, and also despatched observers to Grignon, where M. Bernard used a large spectrograph with a circular slit fed by a cœlostast, and other members of the expedition took direct photographs of the sun through red screens. At both stations excellent results were secured.

At Meudon M. Perot's attempt to measure the rotational velocity of the corona was frustrated by the fact that he could only be sure of measuring the wave-length of the green corona line on the west

side of the sun, 1' from the limb just before the maximum phase. By a rapid setting he found the wave-length to be 5303.7, the value published by Sir Norman Lockyer.

The spectroheliograms secured show that, although there were no spots or faculæ on the disc, there was considerable activity, in the form of prominences and dark filaments, in the upper layers of the solar atmosphere, especially near the poles. M. Deslandres suggests that at sun-spot minimum the activity is transferred from the lower to the higher layers and latitudes.

The positions, dimensions, and intensities of the chief prominences shown on the photographs in "K" (calcium) light, taken with the smaller spectroheliograph at 8h. 56m., are shown in the following table:—

Latitude	E. or W.		Breadth	Height	Intensity
22° N.	...	E.	1	40	1
47° N.	...	E.	3	75	4
17° N.	...	W.	2	10	2
53° S.	...	E.	2.5	50	5
47° S.	...	W.	15	60	5
28° S.	...	W.	7	30	3
12° S.	...	W.	2	25	2

It will be seen that the largest prominence (47° S.) was duplicated by one diametrically opposite, and it will be interesting to see the coronal extensions in these localities if such have been photographed. Photographs taken with the *spectroheliographe polychrome* show that the congeries of particles were more intense thereabouts than in the neighbouring regions, and a similar intensification is shown on the plates taken with the large spectroheliograph, using the green coronal line.

At Grignon the red-screen photographs show the larger prominences, but no details attributable solely to the corona. The photographs with the large photoheliograph are 10 in. in diameter, and should furnish exact measures of position; the central line was obviously south of the observing station at Grignon.

M. Bigourdan gives a chart of the positions of his several instruments at Corneilles-en-Parisis, and finds that he was very near the central line; this was in longitude 0° 7' 20" W. of Paris, and latitude 48° 58' 55" N., the altitude being 163 m. Baily's beads were very fine, and frequently the horns of the decreasing solar crescent were completely detached by the interposition of irregularities on the moon's limb.

A little before second contact M. Bigourdan believed he saw the exterior edge of the dark moon projected against the lower corona or the upper chromosphere. M. Eysséric, who successfully observed shadow bands at the 1905 eclipse, was unable to detect any on this occasion.

In addition to those actually observing at the observatory itself the Paris Observatory had several parties located at various points along the eclipse path, and the results secured were so numerous and various in character that but a small part of them may be briefly mentioned here. It appears certain, however, that nowhere in Europe was the eclipse definitely total. Even in Portugal, M. Salet reports, Baily's beads were to be seen around the moon throughout the whole of the maximum phase, and no one at Ovar saw the corona; he was located near the Bay of Aveiro. Messrs. Slater and Worthington, located about 1.5 km. north of Ovar, saw it for the fraction of a second, and thus it would appear that the "Connaissance des Temps" line was too far south. M. Salet's report would place the central line