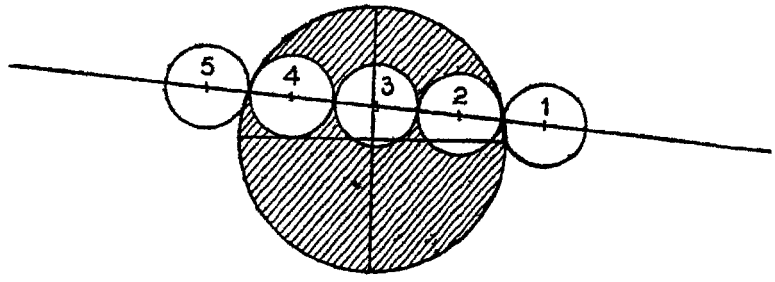
The successive positions of the Moon, as well as the dimension and duration of totality are shown in the following diagram:—



1 represents the position when the Moon enters the shadow.
2 ,, ,, when the Total Eclipse begins.
3 ,, ,, at the middle of the Eclipse.
4 ,, ,, when the Total Eclipse ends.
5 ,, ,, when the Moon leaves the shadow.

The Highest Prominence on Record

By J. Evershed, F.R.S., F.R.A.S., Director, Kodaikanal and Madras Observatories.

The eruptive prominence of May 26th, 1916, photographed at Kodaikanal and Srinagar, is interesting not only because it is the highest ever recorded since prominences were first observed in 1868, but also because so complete a series of photographs was obtained that its development and movements can be studied with accuracy and in unusual detail.

The eruption took place in the early morning between 7 and 10 A.M., Indian Standard Time, and at Kodaikanal the definition was fortunately very good, although there were some interruptions from cloud. At Srinagar, as usually happens all through the summer, definition was excellent throughout a cloudless day. Altogether seventeen photographs were taken, two of which were simultaneous, the mean times being 8h. 21m. 31s. at Kodaikanal and 8h. 21m. 33s. at Srinagar. The spectro-heliograph in Srinagar, which had been specially constructed for the expedition of 1915-16, was designed to photograph a considerable area of sky

surrounding the Sun, and the plates include more than a solar diameter beyond the Sun's limb : thus the highest extensions of the prominence were not missed, and at 9h. 22m. these reached the unprecedented height of 18½ minutes of arc, or half a million miles, above the Sun's surface.

Eight photographs, selected from the combined series of Kodaikanal and Srinagar, are shown in the accompanying plate. The earliest photograph (not here shown) was a large scale image of the disc, exposed at Srinagar at 7h. 47m. to show the flocculi, but as there appeared upon this plate some very high detached streaks rising above a bright prominence, it was at once realized that a great eruption was in progress, and limb photographs were taken in rapid succession. The first, taken at 8h. 6m., shows a bright mass broadest at its summit, and from a point further north a complicated system of streaks rises above it to the height of 12′, which already exceeds the height of almost every prominence before observed. In the next two figures, the bright mass is shown rising with stupendous rapidity and becoming exceedingly brilliant. Between the first and the second figure, the summit rises at a rate of 79 kilometers per second, and the speed accelerates, so that after this the rate is over 200 and later nearly 300 kilometers per second. In the photographs taken at 8h. 50m. and 8h. 56m., the main stem of the great eruption, although inclined southwards, appears to turn over northwards at the highest point, and bend round as if falling back on the Sun. At 9h. 3m. a rapid dissolution of the entire prominence has set in : the main column is seen to be no longer continuous, but broken : and at 9h. 9m. it resembles a series of beads strung on an invisible cord. It will give some idea of the size of this prominence to mention that these beads are each about 5,000 to 7,000 kilometers in diameter. (The white streaks on this, the last figure of the plate, are due to a passing cloud which at Kodaikanal diffused sunlight on to the slit of the spectro-heliograph.) By 9h. 19m. the entire column had completely vanished, and the spectro-heliograph records blank space where ten minutes earlier brightly glowing masses of gas had been photographed. High above the limb, however, there is still a group of brilliant points, and at 9h. 22m. this group, now very faint, was found to have ascended to the height of half a million miles above the Sun.

The simultaneous fading of the whole of this huge prominence, including the northern streaks, is very remarkable, and not less so is the fact that the low bright prominence to the south remained unaltered, in spite of the stupendous

eruption occurring close to it, and was still visible on the next day.

Although this prominence appears to turn over at the top, in form like a fountain, measurements of the actual movements taking place show that all parts of the prominence were moving outwards radially from a point near the base of the main stem, a motion in which the prominence to the north of the main mass took part. The motion was most rapid in the column itself, where bright points were ascending in the direction of the column at rates up to 457 kilometers per second. It seems as if the streamers must represent the projections of spherical shells, which were expanding outwards.

This motion from a central point outwards and upwards is known to take place in small prominences above sunspots, which shoot out transient spikes and streamers, as was shown in the recently published Prominence Memoir issued from the Kodaikanal Observatory. But this great eruption was not above a sunspot, nor even in sunspot regions. The position of the main column was at 48° north on the east limb, and it extended to 68° north. It was, however, very closely connected with a disc marking of another kind. On May 25th, a long dark absorption marking was seen, on both calcium and hydrogen photographs of the Sun, to stretch as an irregular line from near the centre of the Sun's disc to the east limb, and on the 26th, at 8h. 9m. and 8h. 12m. it met the limb almost at the base of the eruption, in latitude 50° north. Twenty minutes later, this part of the marking had completely disappeared. These dark markings, which are frequently photographed at Kodaikanal, are known to be prominences seen in projection on the disc, and it appears that this part of a very long and apparently stable prominence had suddenly been projected into space and quickly dissipated.

The most remarkable facts regarding the whole display are (1) the rapidity, and especially the accelerating speed, of the movement, (2) the radial direction of the movement from a centre on the surface of the Sun, and (3) the suddenness and completeness of its fading. The accelerating speed against gravity, which has frequently been observed at Kodaikanal in eruptive prominences, points to the existence of some repulsive force in the Sun, probably the same as that which acts on comets' tails, and possibly to be explained by light pressure. The radial direction of movement from a point at the base of the column suggests that the force was acting near the Sun's surface, and was localized in a very

small area. The suddenness with which the whole prominence faded lends weight to the assumption, rendered probable by other considerations, that the gas is of exceedingly low density.

An account of the method of observing the variation of latitude at the Royal Observatory, Greenwich.

THE instrument designed by the late Mr. Bryan Cookson was a photographic telescope mounted as a transit instrument on a base floating in a trough of Mercury. It could be rotated in azimuth, clamped in altitude; the telescope would thus trace out in the sky a circle of equal altitude with greater accuracy than an instrument in which a spirit-level was used for finding the Zenith.

In using the instrument two stars were chosen, one in the northern and the other in the southern sky, in such positions as to be nearly at the same altitude on the meridian, these were photographed in succession on the same plate at the times of their passing the meridian, and the distance between their trails on the plate was measured; the distance of the Zenith from each star could then be computed. By comparison of large numbers of results thus obtained the variation of the latitude could be determined. The variation from the Greenwich observations was in close agreement with the results obtained by the International Latitude Commission. The amplitude of the movement of the pole over the surface of the Earth was a small distance, not more than 60 feet, and the precision of the method was shewn by the results.

In the Observatory.—A Monthly Review of Astronomy.

Polar Ice and Solar Activity.

IT may be remembered that E. M. Antoniadi has found evidence of an agreement between the melting of the polar caps on Mars and the Sun-spot cycle (Monthly Notices, vol. lxxvi, p. 643). It appears that great solar activity usually leads to rapid melting of the caps. With our own cloudy atmosphere we should scarcely expect that terrestrial phenomena would respond so directly to changes in the Sun's activity; but, according to Abbé Th. Moreux (La Revue du Ciel, 1917 May), the same relation holds with regard to the Earth's polar ice. He has compared the numbers of ice bergs given in the American pilot charts with the Sun-spot numbers for the years