

ECLIPSE OF THE SUN.

The Great Event of August 7.

How it will occur, and how it will be observed.

The Theory of Solar Eclipses—Their Peculiar Phenomena—The Umbra—The Corona—The Flame.

Eclipses of the Past—Darkness at Noonday—Consternation and Awe—Science Pierces the Shadow, and Light is Revealed at Last.

As when the sun, new risen, looks through the horizontal, misty air...

OUR ECLIPSE.

On the afternoon of Saturday next, August 7, an eclipse of the sun will occur, noteworthy and important.

It will be visible as a partial eclipse from the barren steppes of Western Siberia, across the whole breadth of Alaska, British America, the United States, and the West Indies.

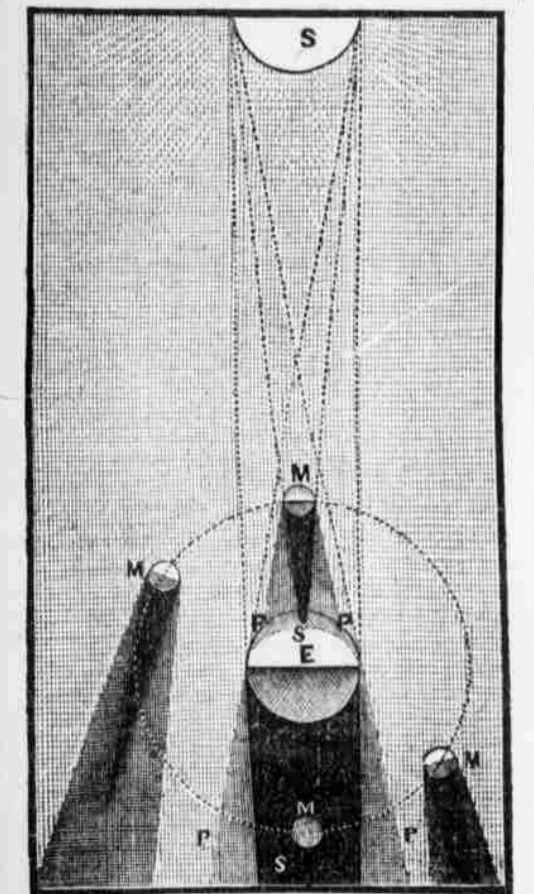


FIGURE 1.—S represents the Sun; M the Moon; E the Earth; P the Penumbra; and S the shadow.

or will occur, in the United States for many years. The sun will rise eclipsed as far westward as the islands of Japan, but to the inhabitants of Sitka, in Alaska, the observation will begin at 11:46 A. M.

Newbern, North Carolina, will be the last point in the United States participating in the total phase of the eclipse.

Eclipses, more than any other celestial phenomena, prove the perfect regularity of the motions of the heavenly bodies.

The heavens declare the glory of God, and the firmament showeth his handiwork!

firmament showeth his handiwork! Thus prominently does its magnificent phenomena proclaim the marvellous order of the heavenly host.

In view of the rarity of such a total eclipse of the sun in our own land; the popular interest that now centres in its occurrence, causes, and effects; the excellent and comprehensive preparations made by our professional astronomers to observe and record its phenomena, we present the readers of THE EVENING TELEGRAPH with an article as exact and exhaustive of the subject as our columns will allow.

THE NATURE OF AN ECLIPSE.

As seen by the accompanying illustration (Figure 1), an eclipse of the sun is caused by the shadow of the moon falling on certain parts of the earth—like the passing shadow of a wind-blown cloud on a river—and hiding the face, or disc, of the sun at those districts.

How Solar Eclipses Occur. The earth and moon are two spherical and opaque bodies, and the halves of both are constantly illuminated by the sun, while the other halves are in the shade.

This cone of shade extends over all the parts of space from which the rays of sunlight are excluded by the interposition of the opaque body. It has two degrees of intensity.

The moon and the earth carry with them in their revolutions these cones of shades, and it is by the projecting of these partial or total shadows upon each other that the phenomena of eclipses are caused.

The calculation has been made and verified that the greatest length of the moon's shadow is 59.75 semi-diameters of the earth, at the same time that we know that the least distance of the moon from the earth is 55.95 semi-diameters.

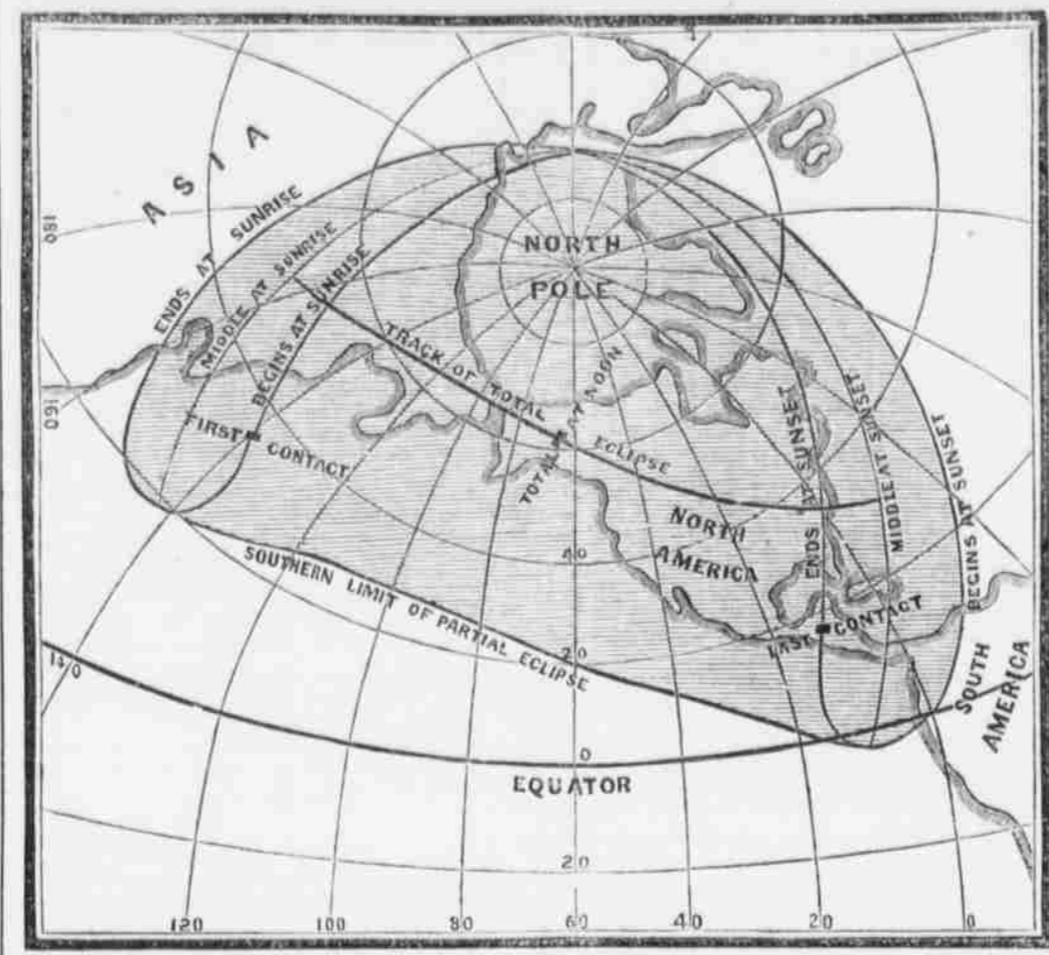
In brief, eclipses may be defined as a short interruption in the passage of light to the earth, which is either real, as in the case of the intrusion of the moon between the earth and the sun, or apparent, as occurs when the earth itself passes between the sun and the moon.

There are three classes of eclipses of the sun. It is total when the dark disc of the moon entirely covers the sun; partial, when only a portion of one side of the sun is covered; and annular, when the moon is at her furthest distance from the earth, so that her cone of shadow blots out only the centre of the sun.

Theory and observation alike prove that in the period of eighteen years and eleven days in which the moon passes to the same position in reference to the sun and its nodes—i. e., one of the two points in which the orbit of the satellite intersects that of its primary—there are in general seventy eclipses, of which forty-one are of the sun and twenty-nine of the moon.

And in a flashing, blazing crown of glory alone left to mark the blotted-out light of the sun, the awe-stricken gazer, be he savant or savage, cannot crush them in his heart's sentiment.

FIGURE 2. THE GREAT SOLAR ECLIPSE OF AUGUST 7, 1869.



In all the dark part of the engraving the eclipse will be visible and partial, except along the heavy black line, where it will be total.

PHENOMENA OF A TOTAL ECLIPSE.

The chance of beholding a total solar eclipse in one's life-time is very small. On the 18th of July, 1860, this opportunity occurred in England, and the one previously observed at Greenwich was in 1715, while an interval of 375 years had elapsed between that and its forerunner.

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The gradual creeping of the moon over the disc of the sun gives no warning of the instantaneous extinguishment of all light. It is not a matter of gradation, so startlingly sudden is the blackness of darkness.

Beasts of burden lie down with their loads on the road, and refuse to move. Swallows in their bewildered dash against the walls of houses, and fall down dead. The dog drops the bone in his mouth, and does not venture to seize it again until light returns.

In some cases when the margin of the moon comes in contact with that of the sun, instead of the faint and regular thread of light which would be expected to ensue, the appearance presented is a broken glimmer of light—a series of bright spots interspersed with dark spaces—which was first noticed by the late Mr. Baily, who compared it to beads of light.

Even during the greatest obscuration, and when the disc of the sun is completely hidden by that of the moon, its place is still made apparent by a halo stretching out an immense distance into space (Figure 3). This light appears in the remarkable form of a corona or lustrous ring, and it has sometimes been so bright as to be observed and mistaken for an annular eclipse.

The coronal light is not a uniform ring, but is irregularly illuminated, giving the appearance of rays, and has been observed of curious shapes, as that of a Greek cross in the eclipse of 1860, and an hour-glass in 1842.

In the eclipses of 1842 and 1851, it was the principal circumstance to which the attention of the observer was directed; and M. Arago was able to perceive what might be termed two rings—the inner one, or that which bordered on the moon's limb, being of a uniform brightness, whence it faded imperceptibly outward, and terminated irregularly.

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In the eclipses of 1715 and 1733, when the sun was wholly eclipsed, and only the corona was visible, the margin of the moon was noticed to be marked with some red spots, which remained visible for some seconds.

Those rose-colored prominences seen in the innermost and brighter zone present the most remarkable phenomena, baffling to science. They are curiously shaped. In 1851 one observer compared them to a boomerang, another to a balloon.

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The exact astronomical figures of interest to this city are as follows:—The eclipse begins at 5h. 5' P. M.; it is greatest at 6h. 51m.; it ends at 6h. 57m.; its duration will be 1h. 49m.; its magnitude 10-9 digits (total eclipse being 12); and its point of beginning 132 deg. The south side will be eclipsed.

ECLIPSE OF AUGUST 7, 1869.

It will be remembered that our earth regularly rotates on its axis once in twenty-four hours, travelling at the rate of 1000 miles per hour to the east; and though to some this may appear

startling, yet how will their wonder be intensified when they comprehend that it has an additional motion in its orbit of 68,000 miles per hour to the west! The moon is revolving around the earth at the rate of about 2300 miles per hour from west to east.

Neither coronas nor rose-hued flames nor coronated rosaries of beads will be visible to the good dwellers in Philadelphia.

Where nothing better can be had, a bit of plain glass, smoked over a candle or lamp, in some parts more deeply shaded than in others, to suit the varying intensity of the sun's rays during the progress of the eclipse, will enable the observer to see most of the phenomena.

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Let the spectator, while looking at the declining sun, imagine a straight line drawn through the sun from top to bottom, and another through the middle from right to left, as if it were to be sliced into quarters like an apple.

For the benefit of those readers who may have the privilege of witnessing the totality, the chief points of popular interest, and those also which can be seen by the naked eye, are briefly recapitulated as follows:—

1. The changes in the color of the sky and the clouds, and in the colors and shades of the distant landscape, and also of near objects. 2. The approach and retreat of the dark shadow, which may be stated approximately to be at the rate of a mile a second.

the moon, and which usually appears three or four seconds previous to the total extinction of the sun's light and continues visible for about the same interval after its reappearance.

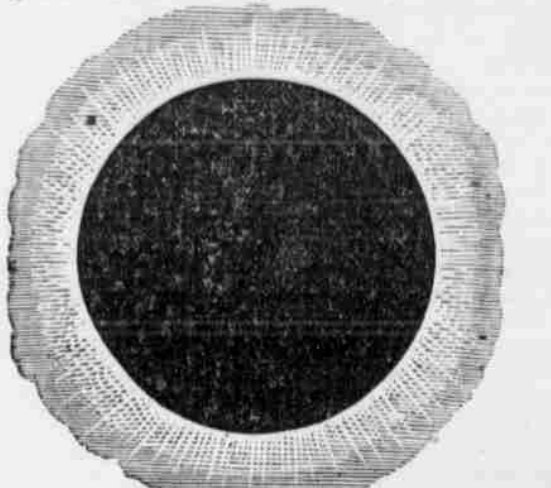


FIGURE 3.—Appearance of the corona at Beaufort, North Carolina, during the total eclipse of November 8, 1854.

The progress of the eclipse is given in the following table, which presents the time of beginning, the middle, and the end, at various points in the United States, together with the number of digits obscured:—

Table with columns: PLACE, Beginning, Middle, End, Digits Obscured. Lists various cities and their corresponding eclipse times.

SCIENTIFIC OBSERVATIONS.

Important scientific expeditions have been organized by the National Observatory, the Nautical Almanac Office, the United States Coast Survey, by many of the leading universities, and by liberal citizens, to view the totality phenomena, with all the facilities for scientific investigation.

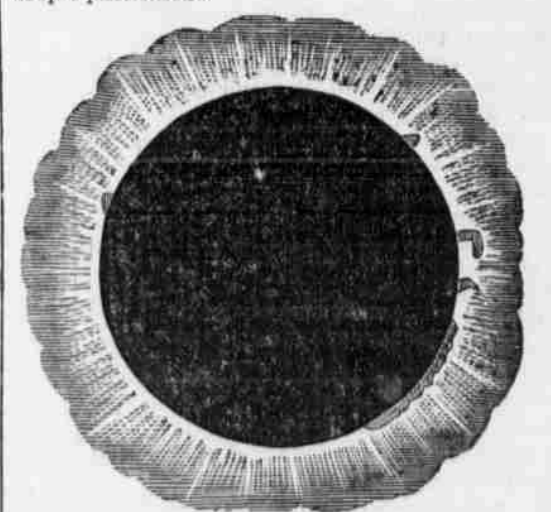


FIGURE 4.—Appearance of the corona and of the rose-colored flames in the total eclipse of July 28, 1851, in Sweden, and of that of August 15, 1850, in India.

The Alaskan Corps. The naval appropriation act of March 3d last having appropriated \$5000 for the observation of the eclipse, to be under the direction of Professor Coffin, the superintendent of the "Nautical Almanac," that gentleman at first decided to select either Ochotsk or Pensjinsk in Siberia, and Norton Sound in Alaska, as the most favorable positions for observing the eclipse.

Two parties were organized for this Territory, which is by far the best point of observation. With reference to the duration of the total phase, there will be a maximum of about three minutes and forty-seven seconds at a point north of New Archangel, in Alaska, to a minimum of two minutes and twenty-eight seconds.