ASTRONOMY

Winter Stars Appearing

Approach of winter heralded by arrival of Orion above the eastern horizon. Total lunar eclipse occurring on night of Nov. 17-18 is visible from both North and South America.

By JAMES STOKLEY

➤ AS THE OCTOBER LEAF is pulled from the calendar to expose the one for November, there is a corresponding change in the evening skies.

The approach of winter is heralded as the constellation of Orion, the warrier, appears above the eastern horizon.

This group, and others now visible, are shown on the accompanying maps, which depict the heavens as they appear about ten p.m., your own kind of standard time, at the first of October; nine o'clock at the middle and eight at the end.

The brightest object shown is the planet Mars, toward the south in the constellation of Aquarius, the water-carrier. Its magnitude now is minus one, less than a quarter as bright as it was at the time of its close approach in September.

It is fading rapidly as it draws away from earth. Mars is the only planet to be seen on November evenings.

Among the stars, which, unlike the planets, shine with their own light, the brightest is Vega, in Lyra, the lyre, toward the northwest. The second brightest is Capella, in Auriga, the charioteer, on view on the northeast.

Dimmed by Earth's Atmosphere

Then come Rigel and Betelgeuse in Orion, in terms of actual brightness. Because they are so low, however, they are dimmed by the greater thickness of air through which their light must pass.

Aldebaran, in Taurus, the bull, is just above Orion in the east, while Fomalhaut, in Piscis Austrinus, the southern fish, appears low in the south. This star, like those in Orion, is dimmed by reason of its low altitude.

Toward the northwest, above Vega, stands the northern cross, really part of Cygnus, the swan. In this group is first-magnitude Deneb, at the top of the cross. Finally, the eighth and last of the first-magnitude stars seen in the November evening skies, is Altair, in Aquila, the eagle, which is low in the west.

Although only Mars appears during the evening, two other planets are visible later in the night. These are both in Virgo, the virgin.

First comes Jupiter, which is even brighter than Mars, and rises about 2:00 a.m. It is followed by Venus, of minus 3.5 magnitude and brightest of all.

Mercury and Saturn, the other planets that may sometimes be seen with the naked eye, are both too close to the sun in November to be observed.

Perhaps the feature of the month's celestial program is a total eclipse of the moon that occurs during the night of Nov. 17, after midnight in the eastern part of the country. This is the third eclipse of the year and the second of the moon. However, it is the first eclipse visible in this part of the world.

An eclipse occurs when another body comes between a bright one and one on which its light is shining. For example, the star called Algol, in the constellation of Perseus, the champion, seen in the northeastern sky above Auriga, really consists of two separate orbs, revolving around each other. One is brighter than the other, however, and every two days and 21 hours the darker one passes partially in front of the bright one. Thus, light from the bright one is reduced for a few hours. This happens, during evening hours, at the times given in the celestial time table.

As the moon travels around the earth every month, it passes the sun at the time of new moon, but generally goes north or south of that body. Occasionally, however, it passes directly in front of the sun, and the lunar shadow then sweeps across the earth.

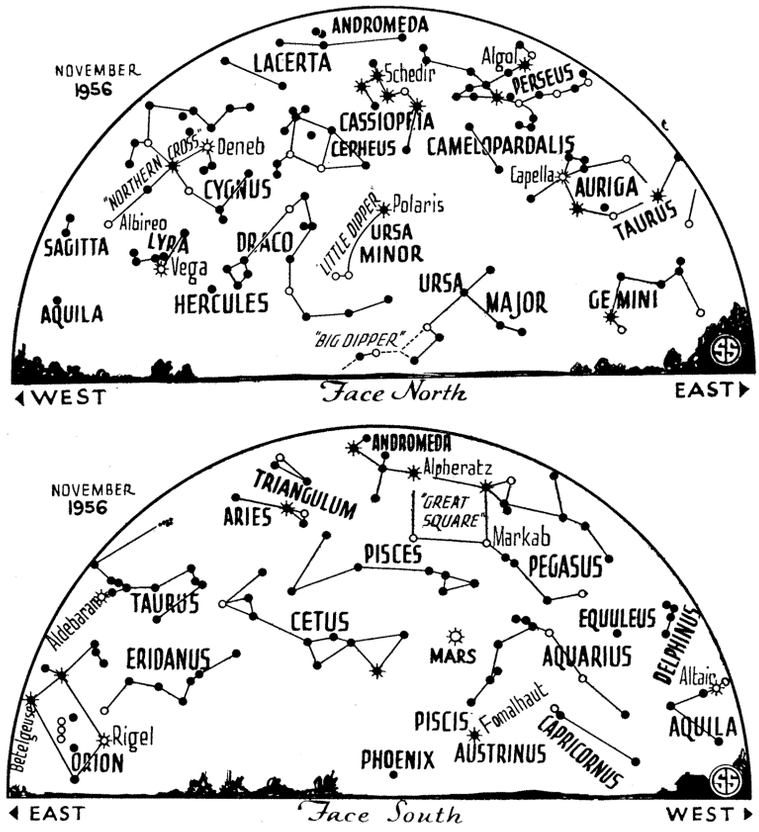
This happened on June 8, when the shadow swept over Antarctica and, if any explorers happened to be in that particular region at the time, they saw a total eclipse of the sun.

Total Lunar Eclipse

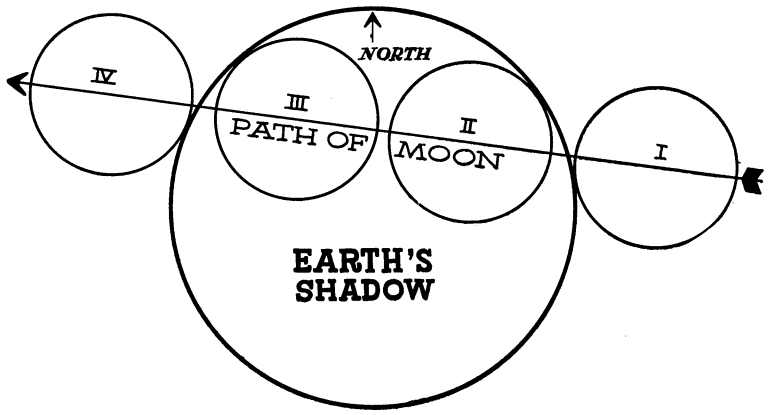
In November it is the moon that is eclipsed. That body has no light of its own, but is visible by the sunlight it reflects to us. Therefore, if anything gets between the moon and sun, the light is cut off. The earth itself does that this month, and therefore we have an eclipse.

Every time the moon is full, it is in the opposite direction from the sun, and we see the entire sunlit half of the moon. But generally it is north or south of the earth's shadow, just as at new moon it usually misses the direct line between the sun and us.

As the moon reaches the full phase in November, however, it enters the shadow and for a period of more than an hour its illumination will be cut off.



☼ ✷ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



	EST	CST	MST	PST
I	12:03 a.m. 11/18	11:03 p.m. 11/17	10:03 p.m. 11/17	9:03 p.m. 11/17
II	1:08 a.m. 11/18	12:08 a.m. 11/18	11:08 p.m. 11/17	10:08 p.m. 11/17
III	2:27 a.m. 11/18	1:27 a.m. 11/18	12:27 a.m. 11/18	11:27 p.m. 11/17
IV	3:33 a.m. 11/18	2:33 a.m. 11/18	1:33 a.m. 11/18	12:33 a.m. 11/18

LUNAR ECLIPSE—The large circle represents the shadow of the earth, and the small circles, I II, III, and IV, indicate the successive positions of the moon as it passes through the shadow at the times shown.

When the sun is totally eclipsed, one must be in the lunar shadow to see the total eclipse, but with one of the moon the whole show is visible wherever the moon can be seen. Thus November's event can be seen by people in both Americas, Europe and northwestern Africa, as well as the Arctic regions and the Atlantic Ocean.

Phases of Eclipse

The phases of the eclipse are shown in the accompanying figure.

At I the moon, moving toward the left, starts to enter the earth's dark shadow. This process takes about an hour and, during this time, the curved edge of the earth's shadow is seen creeping across the face of the moon.

At II the total eclipse begins, and lasts until III, when the moon starts to emerge from the shadow, with the sunlight first shining on its northeastern edge. Once more the edge of the shadow moves across the moon, and at IV it is over.

Even while the moon is totally eclipsed, it does not disappear entirely from view, but has a coppery red glow. This is because the atmosphere of the earth acts as a prism and bends some of the rays of sunlight into the shadow, where they fall on the moon.

As the light passes through the atmosphere, some of its blue rays are absorbed, and what gets through is predominantly red. It is the same effect that makes the setting sun look red, but at eclipse time the rays have twice as long an atmospheric path as those which reach us from the setting sun.

Although an eclipse of the moon does not have the great scientific value of one of the sun, which scientists often travel halfway around the earth to see, the lunar eclipse is an interesting spectacle, and one which will repay the late hours required to view it.

Celestial Time Table for November

Nov.	EST	
2	11:43 a.m.	New moon.
3	1:38 a.m.	Algol at minimum.
5	10:26 p.m.	Algol at minimum.
8	7:15 p.m.	Algol at minimum.
9	2:00 p.m.	Moon farthest, distance 251,300 miles.
10	10:09 a.m.	Moon in first quarter.
12	4:00 p.m.	Mercury beyond sun.
16	early a.m.	Meteors seen radiating from constellation of Leo.
18	1:44 a.m.	Full moon, total eclipse of moon.
21	noon	Moon nearest, distance 228,000 miles.
24	8:12 p.m.	Moon in last quarter.
26	12:09 a.m.	Algol at minimum.
	8:06 p.m.	Moon passes Jupiter.
28	8:58 p.m.	Algol at minimum.
29	12:25 p.m.	Moon passes Venus.

Subtract one hour for CST, two hours for MST, and three for PST.

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