

ASTRONOMY

The Moon Veils Her Face

Total Eclipse is Visible Generally Over the United States on July 15; Sun at Greatest Distance Away

By JAMES STOKLEY

THE FIRST total eclipse of the moon visible generally over the United States since November 27, 1928, is the most striking celestial event scheduled for July. This happens during the night of Monday, July 15. At 10:12 p. m., eastern standard time, the moon, moving continually through the sky from west to east, begins to enter the shadow of the earth, and at 11:09 it will be completely immersed in it, thus beginning the period of total eclipse. At midnight the eclipse will be at its height, and the moon will be farthest in the shadow. At 12:50 a. m., the total eclipse will be over and the moon will start to emerge from the shadow, being completely uncovered at 1:47 a. m.

An eclipse of the moon is not of great scientific importance, but is very interesting to watch. It has the great advantage over a total eclipse of the sun in being visible from more than half the earth. When the moon passes between earth and sun, producing a total eclipse of that body, there is at best only a narrow strip a hundred or more miles wide and several thousand miles long, where the sun can be seen completely covered. But when the moon enters the earth's shadow, as it does this month, the moon can be seen eclipsed from any place where it can be seen at all.

Reflection Only

The moon has no light of its own, but is illuminated by the sunlight falling upon it. When this supply of light is cut off, by the earth passing between sun and moon, our satellite shines with far diminished splendor. It does not darken completely, but assumes a curious copper-red color. This is a result of the bending of the sun's light by the earth's atmosphere. It is well known how the bottom of a basin looks higher when filled with water than when empty, because the rays of light from the bottom are bent downwards as they leave the dense water for the more rarefied air. As the light from the sun passes through the atmosphere, which is considerably denser than the vacuum of inter-planetary space, it is

similarly bent around the earth's curve. As a result most objects in the sky, all those except one directly overhead, appear higher than if we saw them from an airless planet. For the same reason we continue to see the sun for a few minutes after it has actually gone below the horizon.

As a beam of sunlight passes through the earth's atmosphere, some of the blue rays are extracted from it, and reflected to the surface as the blue color of the sky. The light that goes on through, its blue removed, is predominantly red, so that the setting sun often looks red, when the light from it that reaches our eye has to penetrate a greater thickness of air than at noonday. But the light that continues through, and is finally bent around into the earth's shadow, has had to pass through just twice as great an amount of air as that which comes to us at sunset, and the reddening is still more marked.

Seen During Eclipse

Ordinarily, of course, we cannot see this red light, because there is nothing in the earth's shadow to reflect it. At the time of a total eclipse of the moon it is sent back to us, and so the eclipsed moon appears of the peculiar ruddy hue that must have been so startling to the primitive people who saw it, and thought

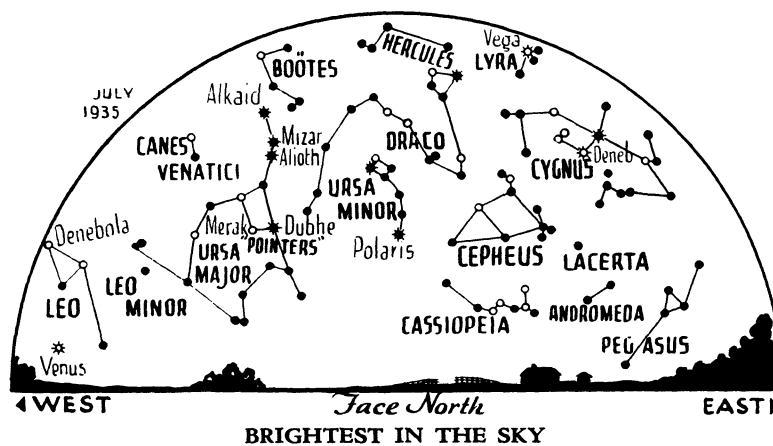
the moon was being devoured by some great dragon.

Even though the earth's shadow is not entirely dark, it has a rather sharp boundary, and it is interesting to watch the progress of the moon while entering it. On July 15, between 10:12 and 11:09 p. m., the shadow will be seen gradually covering the moon, and it will be found noticeably curved. From 12:50 to 1:47, the curved edge of the shadow can again be seen on the moon, as the eclipse is coming to an end. This, of course, is an excellent proof that the earth really has the shape of a sphere, for there is no other geometrical figure that could always cast a circular shadow.

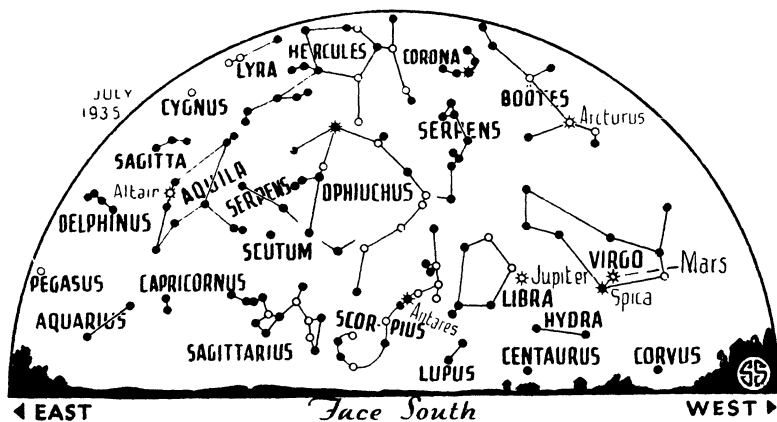
The eclipse on the 15th will be the fifth of the year, the second and last of the moon. The first of the moon was on February 19, but was invisible in the United States except in the far west. Eclipse number six of 1935, a year when there occur the greatest possible number, seven, also happens this month. On July 30, the moon will come partly in front of the sun, but to see it one will have to go to a small region near the Antarctic Circle in the south Atlantic Ocean. Even there, less than a quarter of the sun's diameter will be covered, and the sun will be low in the sky when it happens, so that few people will observe it. The final eclipse of the year will be another of the sun, occurring on Christmas day.

Earth's neighbors in space, the planets that travel around the sun with us to

☼ * ◦ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



But drawing quickly nearer the sun where its brilliance will be dimmed is the planet Venus. If you wish to see it in daylight, look in the west on the afternoon of July 4. There it will be just a little north of the crescent moon.



SUMMER AMONG THE STARS

With the short nights and hot days, summer also brings us characteristic formations in the skies. In the south you may now see the great Scorpius with the red star Antares marking the animal's heart.

form the solar system, have been well placed in the evening skies during recent months, and the display continues during July. Though Mercury cannot be seen, Venus still shines in the west after sunset, and is still increasing in brilliance as it comes closer the earth. On July 1 it will be 64,888,000 miles from us, but on the 31st it approaches within 54,227,000 miles. Its magnitude is minus 4, far greater than any other star or planet, so that it can even be seen in broad daylight if you know where to look. On July 4 the moon, in a crescent phase, passes a short distance to the south of Venus, and this might help in locating it before sunset.

Mars, on the other hand, is drawing away from the earth. When we see it in the southwestern sky at the beginning of the month, it is just a little nearer than the sun, at a distance of 93,882,000 miles, but on the 31st it will have receded to 111,970,000 miles. It is, however, still fairly bright, as its magnitude is plus 0.4, greater than that of any star now in the sky except Vega and Arcturus. The motion of Mars through the sky will be easily seen this month, as it passes the star Spica. On the first it will be well to the west of the star, but at the end it will be even farther to the east.

Second Brightest

Jupiter is the second brightest planet, with a magnitude of minus 1.8. Its distance does not change greatly this month from its distance of 458,260,000 miles on the 15th. Saturn, which is high in the southeast at midnight, is considerably fainter, of magnitude 1, and 666,920,000 miles from the earth.

An eclipse of the moon can occur only at the time it is full, while one of the

sun must be at new, so these phases occur respectively on the 15th and 30th. The times of first quarter and last quarter are July 8 and July 22. On July 5 the moon is at apogee, when farthest from the earth, 251,650 miles away. Perigee, when it is closest, comes on the 17th with an approach of 224,850 miles.

On the evening of July 12 the moon eclipses the star Antares, in Scorpius. At 9:44 p. m., eastern standard time, as seen from Washington, the star will hide behind the dark edge of the moon, which will then be in a gibbous phase, about half way between first quarter and full. The star will reappear at 9:44 p. m. For other parts of the country, the times will be different. People in the far west will not see the occultation at all, for by the time they see the moon rise, it will be over. The disappearance of the star will be interesting to watch, especially with a small telescope, for as it passes behind the dark lunar edge, it will vanish instantaneously. This demonstrates that the moon has no atmosphere. If it had, the star would gradually dim as its light passed through a greater thickness of atmosphere.

Sun Farthest Away

Not only does the distance of the earth and the moon change, but so does that of the earth and sun, over the course of the year. Last January we were nearest the sun, now our planet is several millions of miles farther from it. Aphelion, the time when we are most distant, will happen on July 4, at 9:00 p. m., eastern standard time, when we shall be 94,450,000 miles away. This causes a slight reduction in the intensity of the sun's light and heat reaching the earth at present. But for us in the northern atmosphere, the sun is much higher

in the sky than in winter, and so it is more concentrated as it falls on North America. Despite the sun's greater distance, therefore, we are having summer.

During July the evening skies wear their characteristic summer appearance. In the south the scorpion appears, with the star Antares, red in color, marking the animal's heart, and the vertical curved row of stars to the right its claws. The position is shown on the accompanying maps, which depict the skies as they appear at about 10 p. m., standard time, on July 1, 9:00 p. m. on July 15, and 8:00 p. m. on July 31. Next to Scorpius, to the west, is the group of Libra, the scales, not conspicuous in itself, but easily found at this time because of the presence in it of the bright planet, Jupiter. Farther west is Virgo, the virgin, in which the planet Mars now shines, close to the star Spica. On the other side of the scorpion is Sagittarius, the archer, whose shape resembles that of a teapot, the spout to the right, and the handle to the left.

Dippers, Big and Small

The most brilliant planet in the evening sky is Venus, but it is rapidly drawing nearer to the sun, and the period through which it remains above the horizon after sunset is daily growing shorter. Venus is in the constellation of the lion, Leo. Next to this group, to the north, is Ursa Major, the great bear, of which the well-known "Great Dipper" is part. This implement hangs in the northwest, the handle upwards. By following the "Pointer," the two stars at the bottom of the bowl, over to the right, one comes to Polaris, the pole star, in the "Little Dipper," which, in turn, is part of the little bear, Ursa Minor. On the opposite side of the lesser bear is Cepheus, the king of Ethiopia, and below is the W-shaped group of Cassiopeia, representing his queen.

High in the eastern sky one can now see Cygnus, the swan, sometimes called the "Northern Cross," which is lying on its side. The brightest star in this group, Deneb, is to the north, and marks the top of the cross. Directly above Cygnus appears the brightest star visible in the summer time from most of the United States, Vega, in the constellation of Lyra, the lyre. A little farther south, and lower, is another brilliant star, Altair, in Aquila, the eagle, which can be recognized because of two fainter stars, one just above Altair, the other about the same distance below.

The constellation of Boötes, with the famous Arcturus as its most brilliant star, shines high in the southwest. A

good way to locate this star is to imagine that the curve of the handle of the Great Dipper extends around to the south, and you come right to it. Between Boötes and Lyra appear two constellations that are easily seen in the summer evenings, because they are almost directly overhead. One is the semi-circle of stars forming the northern crown, Corona Borealis, and the other, larger and more prominent, is Hercules, the famous strong man of mythology. Just below him is another giant, Ophiuchus, the serpent carrier, sometimes identified with the famous physician of antiquity, Aesculapius. The serpent which he holds is divided into two parts, one to the east, between Ophiuchus and Aquila, the other to the west, near Boötes.

Low in the east may be seen part of the constellation of Aquarius, the water carrier. Later in the evening, as the earth turns in its daily motion from west to east, it rises entirely into view, and in it can be seen the fourth planet of the July evenings, Saturn. Pegasus, the winged horse, is north of Aquarius bearer.

Science News Letter, June 29, 1935

MEDICINE

New Drug May Save Lives Of Mothers in Childbirth

LIVES of mothers in childbirth may be saved by means of ergotocin. Ergotocin is the newly isolated active principle of ergot, old-time childbirth medicine. For their research leading to its isolation in crystalline form, Drs. F. L. Adair, M. Edward Davis and associates, of the University of Chicago, received the gold medal award of the American Medical Association.

A very small amount of ergotocin injected into the veins will stop dangerous bleeding following childbirth. Because the new substance is poisonous only in enormous doses, it may also be given by mouth if the emergency is not acute. Besides checking bleeding, the new drug hastens contraction of the uterus. For this reason Drs. Adair and Davis believe it should be given routinely for a few days following childbirth.

Other preparations of ergot have been used to check bleeding and to hasten contraction, but results have not always been satisfactory because the amount of the previously unknown active substance in ergot preparations varied.

Besides isolating the active principle of ergot, the Chicago scientists have obtained its chemical formula and are "on the verge" of preparing it synthetically.

Science News Letter, June 29, 1935



A Corridor For Corn

CORN, tobacco, other Indian crops of pre-Columbian times: how did they get into eastern America?

To this riddle, one of the most baffling in the history of agriculture, Dr. Melvin R. Gilmore of the University of Michigan Museum offers an answer. Over the arid belt that separates the moist, arable lands of the eastern United States from Mexico, an earlier home of Indian agriculture, there stretches in one place a narrow zone of land where primitive agriculture was possible.

This "Gilmore corridor" consists of a belt of oak-hickory forest that reaches westward along the scarp of the Edwards Plateau almost to Del Rio on the Rio Grande, linking this region with the mountain valleys of eastern Mexico where there was rainfall enough to invite agriculture, and toward the east widens out into the southeastern and middle-eastern woodlands and the tall grass region of the Plains where cultivation was no longer precarious.

The Jamestown settlers and the Pilgrims found Indians cultivating corn, beans, squashes, pumpkins and tobacco along the Atlantic coast; and the French missionaries and explorers found inland Indians farming by much the same method. In the Southwest, the exploring Spaniards found the Pueblo tribes growing corn by an entirely different method, using irrigation. Without much question, both types of cultivation had come from Mexico, where agricultural civilizations were older and more advanced than they were in the North. If corn did not originate in Mexico, it certainly at least passed through that country.

The northwesterly migration of corn culture went into progressively drier lands, so that irrigation had to be practiced. But the tribes of the central Texas

area lived in a land that was moist enough to grow trees, and hence easily moist enough to grow corn. The "Gilmore corridor" was a narrow bridge, but it sufficed for the introduction of corn-beans-pumpkin agriculture to the Indians of the tall grass prairies and the Eastern woodlands.

The proposal to give the name "Gilmore corridor" to this one place where a fairly rich woodland outflanks the arid plains and plateaus of the Southwest originated with Dr. Dmitri Borodin, Russo-American plant physiologist now working as a guest of the Biological Laboratory, Cold Spring Harbor, New York.

Science News Letter, June 29, 1935

ENGINEERING

New Freight Ships Have Boilers On Deck

BOILERS on deck, instead of in the conventional position in the hold, characterize two new Norwegian coal-burning freight ships recently put into service on an African route. (*Umschau*, May 19).

While the main idea was to gain more cargo space in the hold, several other advantages have developed. The "black crew" is delivered from the infernal heat of the ordinary stokehold in the tropics. Unloading ashes is no longer a problem: a slanting pipe simply discharges them into the sea as fast as they are raked out. Getting the boilers away from the bottom of the ship has done away with the rapid rusting of the bottom plates, always a troublesome factor in steamship operation.

Finally, officers declare that the ships behave much better in a rough sea, even when running empty or only partly laden, than do ships of like tonnage with the boiler weight far down on the keel.

Science News Letter, June 29, 1935

● RADIO

Tuesday, July 2, 3:30 p. m., E.S.T.

THE PUBLIC HEALTH LABORATORY
—ITS VALUE TO MR. AND MRS.
CITIZEN, By Dr. Fred O. Tonney, Director, Technical Service and Research, City of Chicago, Board of Health.

Tuesday, July 9, 3:30 p. m., E.S.T.

THE GEOLOGY OF THE DIAMOND,
By Dr. F. L. Ransome, Professor of Economic Geology, California Institute of Technology.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.