

## ASTRONOMY

# Scorpion Shines in South

A total eclipse of the sun, visible along a path about 60 miles wide crossing Alaska, Canada and Maine, July 20, is the astronomical event of the month.

By JAMES STOKLEY

► WITH THE COMING of July, the evening skies take on their typical summer appearance. The constellation of Scorpius, the scorpion, shines in the south, with the star Antares, distinctly red in color, as the most prominent member.

But the most unusual astronomical event of the month is a total eclipse of the sun, on Saturday, July 20. It will be visible along a path about 60 miles wide, which crosses Alaska, Canada and Maine. The rest of the United States and Canada will see a partial eclipse, with the dark disc of the moon covering only part of the sun's visible surface.

The accompanying maps show the appearance of the evening skies, about 10 p.m. your own kind of standard time (or 11 p.m. daylight saving time) at the first of July, and about an hour earlier in the middle of the month.

The brightest star that is visible is Vega, in Lyra, the lyre, which is high in the east. Below it is the figure of Cygnus, the swan, in which another bright star, Deneb, stands. Both these stars are shown on the map of the northern sky. And to the right of

Cygnus (shown on the southern map) is Altair, in Aquila, the eagle.

The great dipper, most familiar of all stellar figures, and part of Ursa Major, the great bear, hangs in the northwest. At the bottom are Dubhe and Merak, the pointers, which indicate the direction of Polaris, the pole star, over to the right. And the handle of the dipper extends upward, with the stars Alioth, Mizar and Alkaid in a sweeping curve. If you follow this curve over into the southern sky, it brings you to two more bright stars: Arcturus, in Bootes, the herdsman, and Spica, in Virgo, the virgin. The latter group is low in the southwest.

## Mars and Jupiter Visible

Two planets are visible in the evening this month, though neither is very prominent. Mars is visible low in the west in the early evening. It is now quite far away and this, combined with its low altitude, makes it quite faint. Low in the east, in Capricornus, the sea-goat, is Saturn. Later in the night—around midnight—Jupiter rises in the east in the constellation of Pisces

and outshines any other star or planet. Just before sunrise you will see Venus low in the east. It is even brighter than Jupiter but will be harder to see because of the light of dawn and its low altitude.

## Total Eclipse Due

The total eclipse of the sun that will occur on July 20 is the first visible in the United States or Canada since June 30, 1954, and the last until March 7, 1970. However, this one covers quite a different part of the country. The one in 1954 started in the Midwest and its path went northeastward over Canada toward Greenland. That of 1970 will cross Mexico, the Gulf of Mexico and Florida.

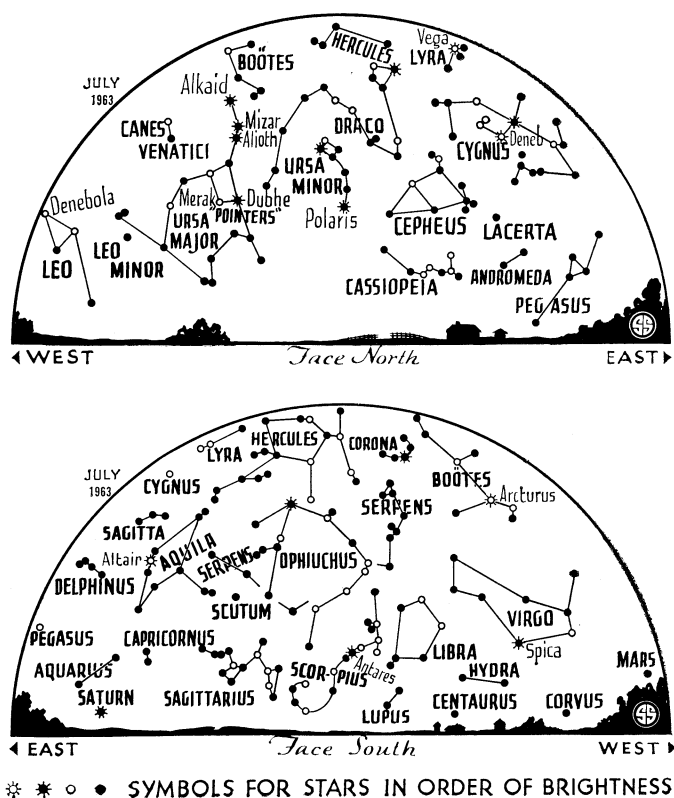
The last eclipse visible in the northeastern part of the country was on Aug. 31, 1932. The path in which that one could be seen as total was similar to that of this year's eclipse. It came down from the Arctic, crossing Hudson Bay, Quebec, Vermont, New Hampshire, Maine and Cape Cod.

An eclipse occurs when one astronomical object moves through the shadow of another. Both earth and moon cast shadows into space—in the direction away from the sun which illuminates them. Once every 29 days the moon goes around the earth and we see it change in phase from new moon, through first quarter to full moon, then last quarter and new moon again. When new, the moon is approximately between earth and sun, and at the full phase the earth is between the moon and sun. But generally they are not exactly in line, and the shadow of one body passes north or south of the other.

## How an Eclipse Occurs

Occasionally, however, full or new moon occurs when the three bodies are in line; then we have an eclipse. On July 6, for example, at the time of full moon, the moon will partially enter the earth's shadow, producing a partial lunar eclipse. As it happens during daylight hours here, we will not see it. From other parts of the world—Europe, Asia and Africa—people will see the shadow of our planet on the face of the moon.

Two weeks later, the moon will have moved halfway around in its circuit of the earth, bringing the new phase. This time the lunar shadow will reach us. Because the sun's 864,000-mile diameter is so much greater than the moon's 2,160 miles, the lunar shadow tapers to a point. At the time of total eclipse the shadow reaches a little farther than the earth's distance of 230,000 miles from the moon. The diameter of the shadow on the earth is 60 miles or so. It first touches our planet on Hokkaido, the northernmost of the Japanese islands. Then it goes northeastward over the Pacific to



Alaska. After that its path curves to the southeast, traversing Yukon, the District of Mackenzie, northern Saskatchewan, Manitoba, Ontario, Quebec and Maine. It crosses the St. Lawrence River at Three Rivers, about halfway between Montreal and Quebec. In Maine, Bangor and Mount Desert Island are in the path.

Around the moon's shadow, or umbra, there is a much larger partial shadow, which covers all of North America, as well as eastern Siberia. Here the moon will partially eclipse the sun, more of it being hidden the nearer you are to the path of the total eclipse traced out by the umbra. The accompanying map shows the path of totality in eastern Canada and Maine, as well as the maximum partial eclipse in 24 cities. In Mexico City only about 8% of the moon's diameter will be covered, in Los Angeles it will be 26%, in Denver 54%, in Chicago 77%, in New York 89% and in Boston 94%.

### Path of Totality

To make the many scientific observations best performed at a total solar eclipse, astronomers and other scientists will travel to various points along the path of totality. They have selected locations that offer the best chance of clear weather, for very often in the past clouds have come in front of the sun at the same time the moon did. Elaborate preparations were thus made in vain.

If you are in the path in Maine, and it is clear, and you are watching the sun with the essential eye protection, such as smoked glass, at about 5:40 p.m., EDT, you will notice a small nick in the edge of the solar disc, as the dark moon starts across it. For about an hour more and more of the sun will be hidden. Then, if you have a good view to the northwest, you may see the umbra approaching, at rocket speed.

By this time only a very narrow crescent of the solar disc is visible, and then the total eclipse arrives. For an instant, the crescent may break up into a series of beads, as the light from the edge of the sun shines through valleys on the edge of the moon. The sun's outermost layer, the corona, flashes into view, around the dark lunar disc. Perhaps some solar prominences, which glow with the red light of hydrogen, will appear at the base of the pearly white corona, which extends in all directions.

Totality lasts only about a minute. As the shadow moves on, the beads reappear, this time on the western edge of the sun. Then comes the crescent, which gradually enlarges. After another hour the sun, low in the west, is shining unobscured.

But even if you are not fortunate enough to be in the path of totality and to see one of the most magnificent sights that nature has to offer, it will be interesting to watch the partial eclipse, on the afternoon of Saturday, July 20.

Be sure to have adequate protection for the eyes, such as several overexposed photographic negatives or the traditional densely smoked glass. Sunglasses, and even welder's goggles, do NOT give adequate protection to the eyes' delicate interior membranes.

(Continued on p. 398)

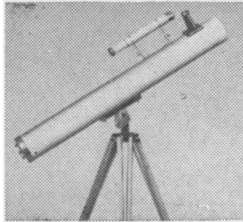
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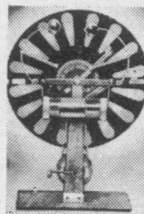
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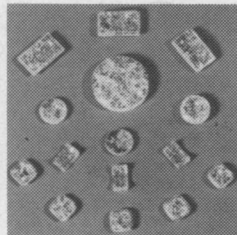
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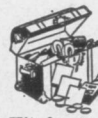


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## Scorpion Shines in South

(Continued from p. 395)

### Celestial Time Table for July

#### JULY EDT

1	2:00 am	Moon farthest, distance 251,500 miles
4		Earth farthest from sun (for year), distance 94,450,000 miles
6	5:56 pm	Full moon (partial lunar eclipse, not visible in U.S.)
9	3:00 pm	Moon passes Saturn
13	3:00 pm	Moon passes Jupiter
	6:00 pm	Mercury behind sun
	9:58 pm	Moon in last quarter
16	2:00 pm	Moon nearest, distance 228,600 miles
20	5:43 pm	New moon, total eclipse of sun
25	6:00 am	Moon passes Mars
28	9:13 am	Moon in first quarter
	8:00 pm	Moon farthest, distance 251,200 miles

Subtract one hour for CDT, two hours for MDT, and three hours for PDT.

• Science News Letter, 83:394 June 22, 1963

#### ASTRONOMY

### "Volcanic Activity" Claimed for Moon

➤ NEW EVIDENCE for "volcanic activity" on the moon is claimed by the Russian astronomer, Dr. Nikolai Kozyrev of Pulkovo Observatory, Leningrad, who in 1958 spotted gas escaping from the lunar crater, Alphonsus.

Now, Dr. Kozyrev reports in London that he has found molecular hydrogen being emitted from the lunar crater, Aristarchus, and he calls this gas "volcanic."

Dr. Kozyrev's belief that gas seeping out of cracks in the lunar surface is volcanic in origin is not generally accepted by astronomers either in this country, Britain or Russia, since there is no evidence for heat associated with the emission.

Dr. Kozyrev's report of his observations of Aristarchus is made in the British scientific journal *Nature*, 198:979, 1963.

• Science News Letter, 83:398 June 22, 1963

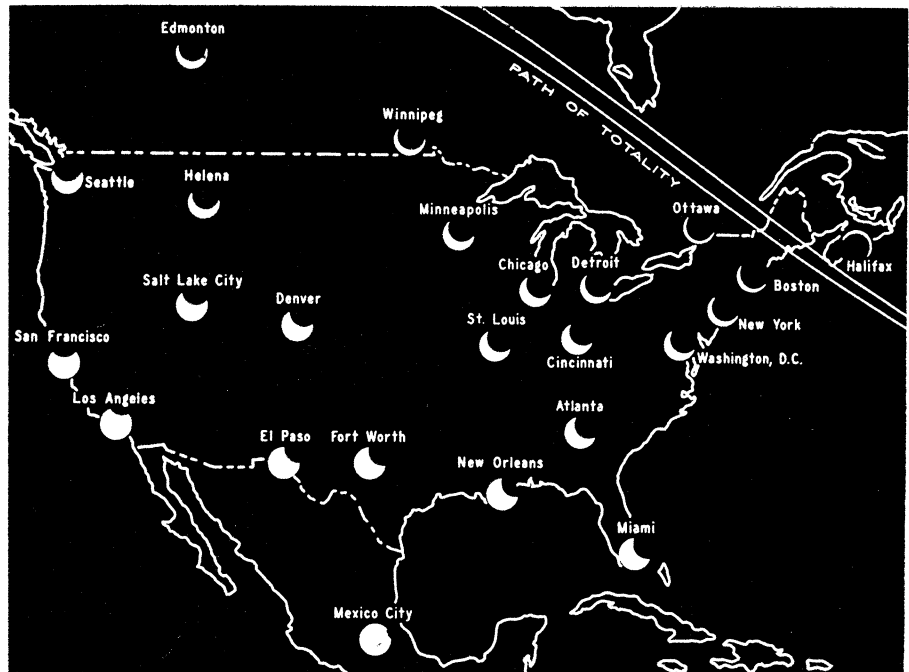
#### SPACE

### Setting Sun Flattened Seen From Space Capsule

➤ OUR GLORIOUS SUN seems shaped like a sausage when observed from a space vehicle.

Photographs taken by Astronauts John H. Glenn and M. Scott Carpenter as they soared through space illustrate this striking phenomenon in the first scientific report of their observations by the National Aeronautics and Space Administration in Washington, D. C.

For more than a hundred years, scientists on earth have computed the refraction theory of the sun's rays. Depending on the curvature of the earth and the height of the capsule, the sun's image seems flattened because the solar rays are bent, or refracted, by the earth's atmosphere. Mrs. Winifred



U.S. Naval Observatory—Sky and Telescope

**ECLIPSE MAP**—This chart shows, for 24 cities in North America, how the sun's visible surface will appear at the time of maximum partial eclipse on July 20. In each case, the crescent is oriented as if the local horizon were parallel to the bottom of the chart.

Sawtell Cameron, Lt. Col. Glenn, Lt. Cdr. Carpenter and Dr. John A. O'Keefe of the Goddard Space Flight Center are authors of the report.

The higher up the space capsule goes, the more compressed the sun's image will seem from it. At certain elevations, the image will appear to be a thin crescent.

• Science News Letter, 83:398 June 22, 1963

#### METEOROLOGY

### Making Rain at Bargain Price Foreseen

➤ RAINMAKING at a bargain is in the offing.

By coating large dry areas with asphalt, scientists hope to modify the weather and induce rainfall in dry regions. The black asphalt patches can store heat radiated from the sun. This heat in turn flows from the asphalt to the ground.

The ground then acts as a giant radiator and warms up the air. Being lighter, hot air rises and creates currents bringing moist air from the sea.

According to recent studies, this process could create rainfall at a cost of three cents for every 1,000 gallons. This estimate is lower than that for desalting sea water, building pipelines from far away rivers or constructing watersheds.

This new rainmaking idea was described at Mexico City by Dr. James Black, petroleum scientist, Esso Research and Engineering Company, Linden, N. J., at a conference on Hurricane and Tropical Meteorology, sponsored by the American Meteorological Society.

• Science News Letter, 83:398 June 22, 1963

#### SOCIOLOGY

### New Farm Problem: Surplus Reproduction

➤ SURPLUS REPRODUCTION will soon be as big a farm problem as surplus production.

The fertility rate of farm families is high. Farm women have an average of 3.33 children, while city women average 2.26.

Proportionately, however, the farm population is decreasing. Less than nine percent of the U.S. population lived on farms in 1960. A century ago, the farmer accounted for 60% of the U.S. population.

As the farmer's efficiency increases, fewer hands are needed to feed the mouths of the nation. While in 1900 each farm worker supported 7.0 people, in 1961 he supported 27.4.

The decreased need for workers is coupled with an increase in the money a farmer has to invest for machinery. Good farmland is limited by acreage allotment programs and building for industrial, military and recreational facilities.

Young people find, for these reasons, that they cannot make a good living on the farm. They migrate to the cities, bringing their problems with them. Their educational lag is a handicap in an increasingly technological society where many will not be able to find jobs.

The U.S. already has the problem of surplus farm production. The Population Reference Bureau, 19:53, 1963, predicts it will be facing the problem of surplus farm reproduction by the 1970's.

• Science News Letter, 83:398 June 22, 1963