ASTRONOMY

Eclipse in the East

Event Visible in Eastern United States and Canada Will Be Annular, or Partial; Spring Stars Appear

By JAMES STOKLEY

THE chief event on the April celestial calendar comes on the 19th, for then people in the eastern half of the United States and Canada will see their first eclipse of the sun since February, 1935. This will only be a partial eclipse, however, and will not arouse very great scientific interest, though, as always, it will be interesting to watch.

Along a path crossing the Aleutian Islands, Alaska and the North Pole, there will be visible what is called an "annular eclipse." Any eclipse of the sun is caused when the moon comes between the sun and the earth. Though the diameter of the moon is only 2160 miles, as compared with 864,100 for the sun, the latter is 92,870,000 miles away, while the moon is at a mere 238,857 miles. Thus, they look about the same size in the sky. But these figures for distance are only average, and both the moon and the sun vary slightly in this respect.

The nearer the moon, the bigger it seems, and if it eclipses the sun while it is close, that body is completely covered. But if the eclipse occurs when the moon is farther away than average, or the sun nearer and bigger, then the moon cannot cover the sun entirely. Even though it comes squarely in front of it, a rim of the sun's disc is seen around the dark moon. This ring, or "annulus" gives us the name of "annular" eclipse.

Because of the brightness of this remaining part of the sun, the solar corona, and other features which are visible at total eclipse time, are not seen. An annular eclipse is of slight scientific value, and no expeditions are going to Alaska to observe it.

Partial in United States

Over an area larger than that of the annular eclipse, the moon will come partially in front of the sun, producing a partial eclipse. The region where some eclipse will be seen includes the rest of Alaska, all of Canada, all the United States (except the peninsula of Florida), Greenland, Iceland, most of the north Atlantic Ocean and eastern Europe.

The nearer one is to Alaska, the more fully will the sun be hidden. In Juneau, Alaska, for instance, 92 per cent of the sun's diameter will be covered. In New York, only 16 per cent will be eclipsed. There the moon will start to bite into the sun at 10:58 a. m., E. S. T., the eclipse will be at its height at 11:50 a. m. and it will be over at 12:43 p. m. In Chicago it will be a third of total, beginning at 9:20 a. m., C. S. T., at maximum at 10:25 a. m., and ending at 11:33 a. m. For San Francisco, where the eclipse will be 59 per cent full, these times are, in P. S. T., 6:38 a. m. for the beginning, 7:39 a. m. for the middle, and 8:47 a. m. for the end. New Orleans will barely see it at all, for there will only be 9 per cent, with the times, in C. S. T., 9:18 a. m., 9:56 a. m. and 10:36 a. m.

Protect Your Eyes

Of course, no one should try to look directly at the sun for it might cause serious injury to the eye. Smoked glass, or, still better, a densely exposed and developed photographic film, is a good protection. Another scheme is to look through a pinhole in a card. This dims the sun's light to a comfortable extent. Even in places where as much as half of the sun's diameter is covered, there will be no noticeable darkening of the landscape, as far as the eye can tell.

The April evening skies mark the virtual end of the appearance of Orion, the huge warrior which until recently has blazed in the south. He can still be seen, of course, but his glory is at an end. The accompanying maps show the appearance of the heavens at 10:00 p. m. on the first, 9:00 p. m. on the 15th, and 8:00 p. m. on the 30th. There, on the map for the south, right over the word "west," you see him indicated, but how different is this from the way he was in December and January!

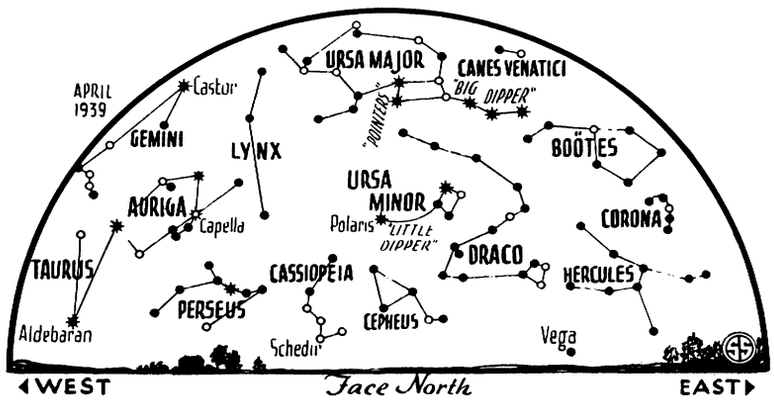
Rigel, the bright star in his heel, is so low that it does not appear on the map, though earlier in the evening it can be seen, below the three stars in a row which mark the belt. Betelgeuse, in one of his shoulders, is still apparent. So also is nearby Sirius, the dog star, in Canis Major, the great dog. To the right of Orion, and about as high, is Aldebaran, in Taurus, the bull, which has also lost his former splendor. But during the summer these stars will return to visibility, in the morning, just before sunrise. Then they will gradually rise earlier and earlier, until, about next Christmas, they will again be as prominent as they were a short time ago.

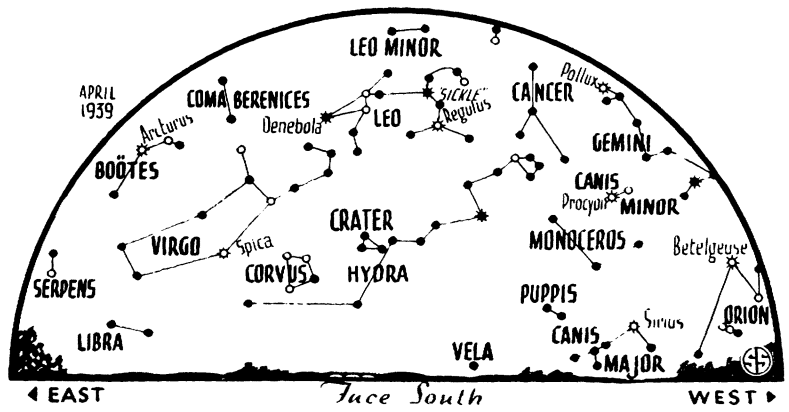
Taking their places, we have a new crop of constellations, most conspicuous being Leo, the lion, which is now in the south. The "sickle," with Regulus at the end of the handle, enables this group to be recognized easily. To the north, swings the ever-familiar great dipper, of Ursa Major, the great bear. The pointers, marked on the map, show the way to the pole-star, below.

"Cutter's Mainsail"

If you follow the curve of the dipper's handle southward, you come to Arcturus, in Bootes, the bear-driver, and then to Spica, in Virgo, the virgin. To the right of Spica is a quadrilateral of stars called Corvus, the crow, and sometimes, from its shape, the "cutter's mainsail."

To the west, above Orion, are Gemi-





ni, the twins, with Castor and Pollux. To their left, and a little lower, just above Sirius, is Procyon, in Canis Minor, the lesser dog. About as high, in the northwest, is Capella, in Auriga, the charioteer. And low in the north, like a "W" resting on one side, is Cassiopeia, the queen.

No planets are placed this month in such a position as to be shown on the maps. In the last few days of April Mercury will be seen low in the east, in the morning twilight. Venus is still the conspicuous morning star, visible in the southeastern sky, even after dawn has started to break, but it is drawing closer to the sun. Jupiter is in the same direction, and will pass Venus on the evening of April 21, when the planets are not visible in the United States. But if you look at them the next morning, you will still see them close together, with Venus the more brilliant of the pair. Saturn this month is nearly in line with the sun and will not be seen at all.

Only Mars is left, but that is seen as a brilliant red planet, in the constellation of Aquarius, in the east after midnight. We now have a foretaste of the summer, when it will be closer, and brighter, than for many years past.

Celestial Time Table for April

Saturday, April 1, 8:00 a. m., moon nearest earth, 226,500 miles away. **Monday, April 3,** 11:18 p. m., full moon. **Monday, April 10,** 12:27 a. m., Algol at minimum; 4:33 p. m., moon passes Mars, about 11 lunar diameters to north. **Tuesday, April 11,** 11:11 a. m., moon at last quarter. **Wednesday, April 12,** 9:16 p. m., Algol at minimum. **Thursday, April 13,** 4:00 a. m., moon farthest away from earth, 251,400 miles away. **Saturday, April 15,** 6:05 p. m., Algol at minimum. **Sunday, April 16,** 11:04 p. m., moon passes Jupiter about 10 lunar diameters to north; 12:54 p. m., moon passes Venus, about 11 lunar diameters to north. **Wednesday, April 19,** morning, partial eclipse of sun, seen as annular in Alaska; 11:35 a. m., new moon. **Friday, April 21,** early a. m., meteors from constellation of Lyra; 9:00 p. m., Venus passes Jupiter about half a lunar diameter to south. **Wednesday, April 26,** 1:25 p. m., moon at first quarter. **Friday, April 28,** 5:00 a. m., moon nearest earth, 229,400 miles away.

Eastern Standard Time throughout.

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PHYSICS

Cosmic Ray Research Will Aid Study of Distant Nebulae

COSMIC RAYS, already a potent means of learning new things about the nuclei or "hearts" of atoms, will next have the task of helping scientists discover new facts about distant nebulae.

This new role of cosmic ray research in the future was suggested at the Sigma Xi lecture at Louisiana State University by Prof. Carl D. Anderson of California Institute of Technology.

Prof. Anderson, brilliant young winner of the Nobel Prize in Physics in 1936, when he was only 31 years old, is noted for his researches on cosmic rays and for his discovery of the positron, fundamental atomic particle.

"Cosmic ray researches have told us new facts about the smallest things in the universe, the elementary particles," Prof. Anderson said. "They give rich promise of telling us in the near future equally important facts about the largest things in the universe, about the far-away nebulae and other astronomical bodies.

"Cosmic ray investigations will support and be supported by astronomical investigations. The electroscope, Geiger counter and cloud chamber will work hand in hand with the 200-inch telescope, each doing an important job in translating into knowledge those messages which come to us from outer space."

The energies of some cosmic ray particles are enormous, Prof. Anderson continued. They are more than 1,000 times as energetic as any other particles known in the science of physics.

In studying cosmic rays in the laboratory scientists are in effect "sitting in" at the death and birth of matter, declared Prof. Anderson:

"A certain electron, for example, which may have been playing its prosaic role as a part of an atom for hundreds or thousands of years, will be struck a blow so hard that it will be projected through space at a speed greater than a hundred thousand miles a second; it will in turn strike several million other electrons and pass through several million atoms before it is finally brought to rest and again attaches itself to another atom, where it may carry out its normal duties with very little disturbance for perhaps another million years."

"Twins" Born

Other electrons, however, may be annihilated by the cosmic ray impact. After several million years' existence, perhaps, suddenly this electron disappears. But out of this annihilation a new electron appears which is one of a set of atomic "twins." These twins are alike except that they have opposite electrical charges.

Such positive and negative electrons, created in pairs, follow a greatly different "life" pattern. The negative electron joins other similar electrons and takes up a normal existence in some other atom.

The positive electron, however, survives only for about a billionth of a second. In this brief fraction of time the positive electron finds a negative electron and the two combine and neutralize their electrical charges. By this union, Prof. Anderson said, they are annihilated and in their stead appear "two bits of radiant energy whose ultimate fate will be to interact with other electrons in the surrounding material."

Prof. Anderson's lecture is the first of