

ASTRONOMY

Mars Now Prominent

The "red" planet is now relatively close to earth, shining brightly high in the southeastern sky. Spring officially commences on March 20.

By JAMES STOKLEY

► MAKING ITS CLOSEST approach to earth in four years, the planet Mars shines brightly in the March evening sky. Easily identified by its characteristic red color, it stands high in the southeast in the constellation of Leo, the lion.

The accompanying maps will help you locate it and the other celestial objects now visible. These maps show the sky as it appears about 10 p.m., your own kind of standard time, at the beginning of March, an hour earlier at mid-month and two hours earlier as April begins.

Mars is not the only planet visible these evenings. Low in the west, in Taurus, the bull, stands Jupiter. Unlike Mars, which is visible all night, Jupiter sets in the west before midnight.

Taurus is also the location of a first magnitude star, distinctly red, called Aldebaran. Most of Taurus is shown on the map of the southern sky. To its left is Orion, the warrior, with the two bright stars Betelgeuse and Rigel. Between them is a row of three stars that forms the warrior's belt.

Above Orion lies Gemini, the twins, with Pollux of the first magnitude and Castor, a little fainter. To Orion's left and a little lower is Canis Major, the great dog, with Sirius, the brightest star visible in the night sky. Higher in the sky—above the faint constellation of Monoceros, the unicorn—is the lesser dog, Canis Minor, with Procyon.

Regulus in Leo, where Mars stands, is another first magnitude star. It is in a subgroup called the Sickle, because of the shape. Below Leo is Virgo, the virgin. Here, near the eastern horizon, the star Spica is shown. This also is of the first magnitude, but in this position it appears much fainter because it is so near the horizon that much of its light is absorbed by the earth's atmosphere.

Mercury Also Visible

High in the north toward the east is Ursa Major, the great bear, of which the Big Dipper is part. In the dipper's bowl are the well known pointers that direct you to the pole star, Polaris, in Ursa Minor, the lesser bear. If you follow the curved line of the dipper's handle toward the right, it will bring you to Arcturus, in Bootes, the herdsman.

Although it does not appear on our maps, March brings the year's best opportunity to see the rarely visible planet Mercury, which is nearer to the sun than any other. As seen from the earth, Mercury appears to move quickly from one side of the sun to the other several times in the year, the reason for its name. The planet is most easily

visible when it is at its greatest angular distance from the sun. When this elongation is east of the sun, it is an evening star, setting soon after the sun. When the elongation is west, Mercury is a morning star. On March 21 it will be farthest east of the sun in the sky and remain visible for a while after sunset. For a week or so around this date, look low in the west as dusk gathers. If it is a clear night, Mercury should be easily visible. However, even on the 21st it sets about an hour and a half after the sun—before the sky is completely dark.

On March 20, at 3:05 p.m., EST, the sun will be standing directly over the equator. This is the equinox—the beginning of spring in the Northern Hemisphere and of autumn in the Southern.

The earth is 93 million miles from the sun, around which it revolves once in 365.26 days from fixed star back to that star—the period we call a year. Mars is 141.5 million miles from the sun and it goes around once in 687 days. But while the earth makes one complete trip in its orbit, Mars has moved well ahead. If we pass Mars on a certain

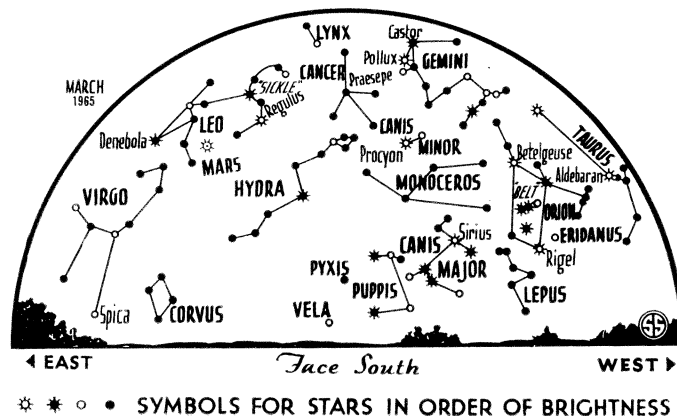
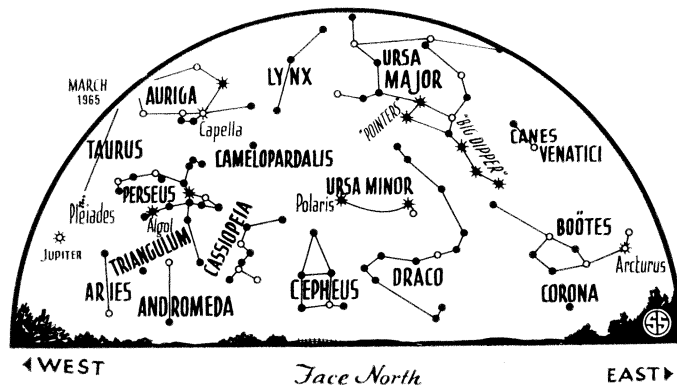
day, it is not until 780 days later on the average that earth passes it again.

When earth passes Mars, the planet stands exactly opposite the sun, so this position is called "opposition." Then, of course, is when earth is nearest Mars. If the orbits of Mars and earth were exactly circular, at every opposition the two planets would be the same distance away: somewhat more than 48 million miles, or the difference between 141.5 million and 93 million.

Orbit Affects Distance

However, the orbits are not circular, and the figures given are mean distances from the sun. In January the earth is about three million miles closer to the sun than in July. With Mars the difference is even greater. Mars can come as close to the sun as 129 million miles, or it can get as far away as 155 million miles—a difference of 28 million miles. During each Martian year of 687 days, it is once at perihelion, when it is nearest the sun, and once at aphelion, when it is farthest away.

If an opposition of Mars happens to come when that planet is nearly at its greatest distance, as it does this year, the approach is not very close. On March 11, at about 8:00 p.m., EST, Mars will be nearest for this



trip around its orbit, but it will be 62,102,000 miles away.

The coming oppositions at 780-day intervals will be better and better, until the one on Aug. 10, 1971, when Mars will be but 35 million miles from us, or not much more than its least possible distance of 34.5 million.

An intensive study of Mars—by landing an unmanned spacecraft as well as by telescopic observations from earth or from orbiting observatories—may therefore be made in 1971.

Mars itself is a little more than half the diameter of earth: 4,200 miles compared with 7,917 miles. It contains only 11% as much matter as earth. This makes its density 0.70 and its superficial gravity 0.376. Thus, a 200-pound man on earth would weigh 75 pounds on Mars.

About a third of the Martian surface is covered with dark markings, the rest with brighter orange areas. These give the planet its characteristic reddish hue. It has an atmosphere that is very thin, containing no appreciable oxygen and very little water vapor. We, apparently, could not survive there without supplying our terrestrial type of atmosphere.

When people think of Mars, they often think of its so-called "canals." These controversial markings, which some astronomers have suggested might be evidence of a well developed civilization, are probably illusory. When the human eye sees disconnected spots and streaks that are not quite near enough to be distinctly recognized, the brain tends to join them into lines. This may happen with random markings on Mars. Even through a large telescope we cannot see the planet any better than we see the moon through a pair of binoculars.

But the problem of the canals is not settled. That is one reason why astronomers are looking forward to the close-up views of Mars that will probably be made from Mariner IV and other spacecraft.

Celestial Time Table for March

MAR.	EST	
2	5:00 a.m.	Moon passes south of Venus
3	4:56 a.m.	New moon
8	10:00 a.m.	Moon passes south of Jupiter
9	1:20 a.m.	Algol (variable star in Perseus) at minimum brightness
	7:00 a.m.	Mars opposite sun
10	12:53 p.m.	Moon in first quarter
11	8:00 p.m.	Mars nearest earth; distance 62,102,000 miles
	10:10 p.m.	Algol at minimum
14	4:00 a.m.	Moon nearest earth; distance 227,500 miles
	7:00 p.m.	Algol at minimum
16	noon	Moon passes north of Mars
17	6:24 a.m.	Full moon
20	3:05 p.m.	Sun over equator, spring begins in Northern Hemisphere
21	3:00 p.m.	Mercury farthest east of sun; visible low in west at dusk for a few days around this date
24	8:37 p.m.	Moon in last quarter
26	1:00 a.m.	Moon farthest; distance 251,300 miles
30	8:00 a.m.	Moon passes south of Saturn

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

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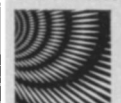
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