

ASTRONOMY

Mars Appears Late

The red planet Mars, steadily approaching nearer to the earth, will be the brightest object in the sky when it appears late in August evenings.

By JAMES STOKLEY

► THE RED PLANET Mars, shining more brilliantly than any other planet or any star visible at the same time, will appear in the eastern sky late in August evenings. This is the first time this year it can be seen before midnight.

Since last September, when it was farthest away, out on the opposite side of the sun, Mars has been drawing closer to the earth. From a distance of 84,500,000 miles on Aug. 1, it comes to within 64,000,000 miles on the 31st. During the autumn the approach will continue and it will be nearest Nov. 8, only a little more than 45,000,000 miles away, nearer than it will be for the next 15 years.

Although the accompanying maps show the appearance of the evening skies in August, Mars is not shown. This is because they are prepared for about ten o'clock, your own kind of standard time (add one hour for daylight saving), at the first of August, an hour earlier at the 15th and two hours earlier at the end of the month. Mars rises after these hours.

Even more brilliant than Mars is Jupiter, which sets, at the beginning of the month, about two hours after sunset. It, too, fails to get on our maps. However, it is in the constellation of Virgo, the virgin, the eastern part of which is shown low in the southwest, to the right of Spica, the brightest star in Virgo.

One planet is shown on the maps. This is Saturn, fainter than either Mars or Jupiter, but equal to a first-magnitude star. It is in Ophiuchus, the serpent-bearer, seen in the southwestern sky. Just below is the constellation of Scorpius with the red star Antares.

Vega: Most Brilliant Star

The most brilliant star of the August evening is Vega, in Lyra, the lyre, which stands directly overhead at the times for which the maps are drawn. Nearby, toward the south, is Aquila, the eagle, with Altair. Toward the east is Cygnus, the swan, in which Deneb is to be found.

Another bright star, second only to Vega, is in the west. This is Arcturus, in Bootes, the bear-driver, a reference to its proximity to Ursa Major, the great bear, of which the "big dipper" is a part. This figure is seen to the northwest. In the lower part are the two "pointers," whose direction leads to Polaris, the pole star, which is part of the little dipper, in Ursa Minor, the little bear.

The stars mentioned, except Polaris, are all of the first magnitude, but some fainter ones are also seen, which form characteristic groups, easily identified.

In the south, just to the left of Saturn, for example, is Sagittarius, the archer. The stars here form the outline of a teapot, with the handle to the left and the spout to the right, just above the hook-shaped group of stars that make the tail of the scorpion. In the east is the "great square," mainly part of Pegasus, the winged horse; the square resting on one corner.

The star in the left corner is Alpheratz, which is in Andromeda, the fettered princess. And to the left we see her mother, the queen, Cassiopeia. These stars form a letter W, standing on one side, the top of the letter to the left.

Starry Metropolis

When we look toward the teapot-shaped constellation of Sagittarius in the south, we are looking "downtown" in the metropolis of stars of which we are a small and rather insignificant part. For the stars, many of which, like the sun, may well be accompanied by a family of planets, are arranged something like houses and other buildings. Here is a great city. At the center these structures are packed very closely together; farther out they are more scattered. Then comes an interurban area where you find only an occasional house, until you approach

another city. At the heart of this the buildings again are closely packed.

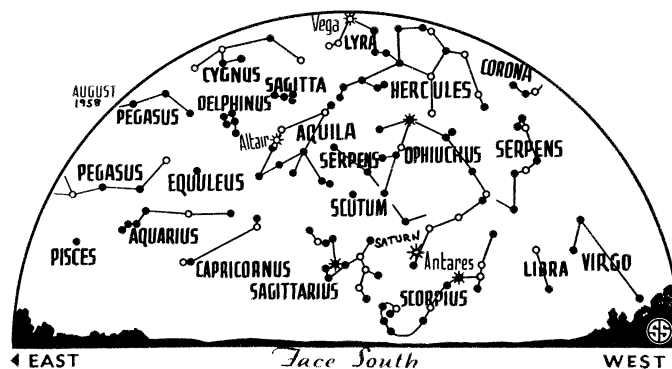
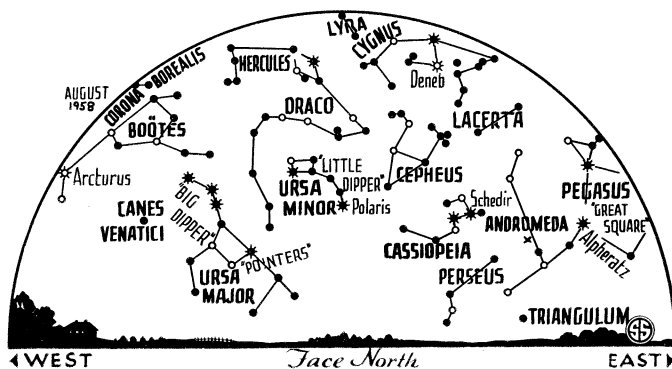
Our stellar city is the Milky Way galaxy, shaped something like two soup plates stuck together facing each other. In it are about a hundred billion stars. The diameter of the galaxy is about 600 quadrillion miles. Expressed in the astronomer's unit, this is about 100,000 light years. (A light year is about six trillion miles—the distance a beam of light will travel in a year.) At the center the thickness is about 10,000 light years.

Earth Is "Up-town"

The earth is located about two-thirds of the way out from the center to the edge and at this distance the thickness of the galaxy is perhaps 2,500 light years. The center is in the direction of Sagittarius, so when we look that way, we are looking "downtown."

The whole galaxy is rotating, although not like a wheel. Rather is it similar to the motion of the planets in the solar system, with those innermost going fastest. At the sun's distance from the center, it makes one complete revolution in some 200,000,000 years, a period sometimes called the "cosmic year."

It is because of the shape of the galaxy that we see the Milky Way, which is the concentration of stars as we look out toward the edge, in the galactic plane. Toward the sides, the stars are much more sparse. At this time of year we can see the Milky Way



◊ * ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



extending from Cassiopeia in the north, through Cygnus nearly overhead, down to Sagittarius in the south. It is hard to see from a city, in competition with city lights, but with a dark sky, out in the country, it is readily apparent. Even a pair of binoculars will show that it consists of a swarm of individual stars and they are most numerous in the direction of Sagittarius, where the Milky Way looks brightest. This, of course, is the direction of the galactic center, which is about 30,000 light years away.

Millions of Galaxies

Just as there are other cities, beyond the limits of your own, at various distances, so are there other galaxies, millions of them, in fact, scattered throughout the universe. One of the closest is just visible to the naked eye, on a dark night, in Andromeda. Its position is shown by a small "x" on the map.

Its distance is about 1,500,000 light years, so it is by far the most distant object that one can see with the naked eye.

In size the Andromeda galaxy equals ours. It may even be somewhat bigger. This represents a reversal of opinion among astronomers in recent years for they used to think it considerably smaller than ours. Then they found that the dimensions of our own had been overestimated, which partly removed the discrepancy.

Next they revised the distance scale for the other galaxies, and the one in Andromeda turned out to be about twice as far as they had supposed. Therefore, to look the size that it does in the sky, it had to be twice as large.

Life in Space?

As we reach out farther and farther into space, with bigger and bigger telescopes, more and more galaxies come into view. Some, like the one in Andromeda, have a spiral structure, like a huge pinwheel. Others are shaped like a flat lens, and show few details of structure. A third class shows an irregular shape, with no particular form. These are the components of our universe: millions and millions of galaxies, each containing millions or even billions of stars.

A good proportion of these stars are probably accompanied by planets like those around the sun. Many of these planets may well be inhabited. It no longer seems that our earthly life is unique—or nearly so.

Celestial Time Table for August

August EST	
5	1:00 p.m. Moon farthest; distance 251,300 miles.
7	4:45 a.m. Moon passes Mars.
	12:49 p.m. Moon in last quarter.
12	early a.m. Meteors visible; emanating from constellation of Perseus.
13	6:02 a.m. Moon passes Venus.
14	10:33 p.m. New moon.
17	10:00 a.m. Moon nearest; distance 226,200 miles.
19	10:06 a.m. Moon passes Jupiter.
21	2:45 p.m. Moon in first quarter.
23	2:47 a.m. Moon passes Saturn.
29	12:53 a.m. Full moon.

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

Science News Letter, July 26, 1958

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