ASTRONOMY

# The Evening Skies in March

By JAMES STOKLEY

WHAT is in some ways the most welcome astronomical event of the month of March comes on the morning of Saturday, the twenty-first, at seven minutes after nine, eastern standard time. The most careful watcher of the sky, looking through the largest telescope, would see nothing at this moment, but that is the time, according to astronomical convention, when the winter season comes to an end, and spring commences.

Because the axis of the earth is not perpendicular to the plane in which our planet revolves around the sun, but is inclined about 23½ degrees, the north pole sometimes leans towards the sun and sometimes away. The former brings summer, the latter, winter.

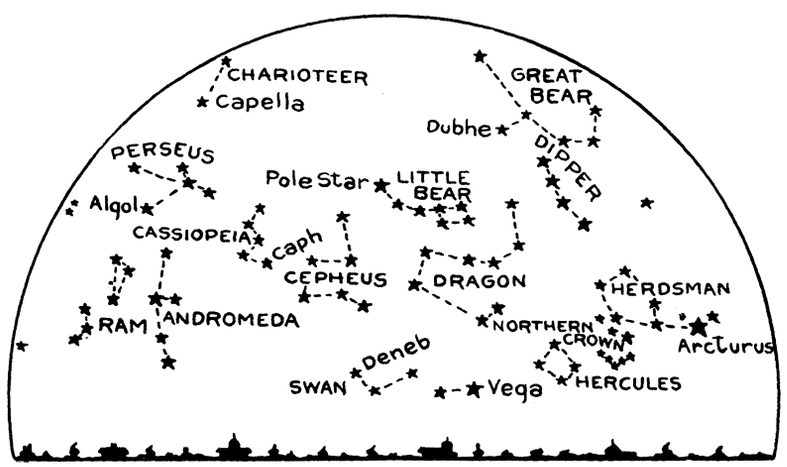
Another result is that the sun moves north and south through the sky. Its path through the sky, called the ecliptic, crosses the equator at a point called the vernal equinox, and it is this point that the sun reaches, this year, at 9:07 A. M., eastern standard time, on March 21. Because the sun is then on the equator, it rises directly east at six A. M. and sets directly west just twelve hours later. This makes the days and nights of equal length at this time; hence the name, "equinox."

If you watch the place and time of sunrise or sunset after the twenty-first, you will notice that sunrise comes a little earlier each day, and is a little farther to the northeast. Similarly, sunset is a little later, and more to the northwest. This will continue until the time of the summer solstice, on June 22, and after that, the sun will once more move southward through the sky.

The normally excellent display of bright stars which March brings to the night heavens is supplemented now by two bright planets, Jupiter and Mars. Jupiter is the most brilliant object in the evening sky, with the exception of the moon, and is high overhead in the west. It is in the constellation of Gemini, the twins, marked by the stars Castor and Pollux. Pollux is the brighter of the pair, and is almost directly east of Jupiter. A little farther east, almost directly overhead, is the planet Mars. During the first part of the month Mars is brighter than Pollux, but it is diminishing in brilliance and at the end of the month its brightness will be between that of the two twins. But its steady, reddish light, different from that of the scintillating stars, makes it easy to identify.

The brightest of all the stars is Sirius, the dog star, in the group of Canis Major, the great dog. It is now in the southwest, and though inferior to Jupiter, its brightness makes it conspicuous. Above Sirius, a little more than half of the way to Mars, is another bright star, Procyon, marking Canis Minor, the little dog. To the right of Sirius, and below Jupiter, is the famous group of Orion. The three stars marking this warrior's belt are almost horizontal. Above them is the brilliant, reddish Betelgeuse, and below is Rigel. Somewhat fainter is Bellatrix, to the right of the belt. Still farther to the right is a star which for redness is even more conspicuous than Betelgeuse: Aldebaran, the eye of the bull, Taurus. To the northeast of Aldebaran is still another brilliant star, Capella, in Auriga, the charioteer.

For the other first magnitude stars of the March evening sky, you must look in the opposite direction. In the eastern sky, a little to the south, is Spica, in Virgo, the virgin. Above is the constellation of Leo, the lion, with the group of six stars forming the so-called

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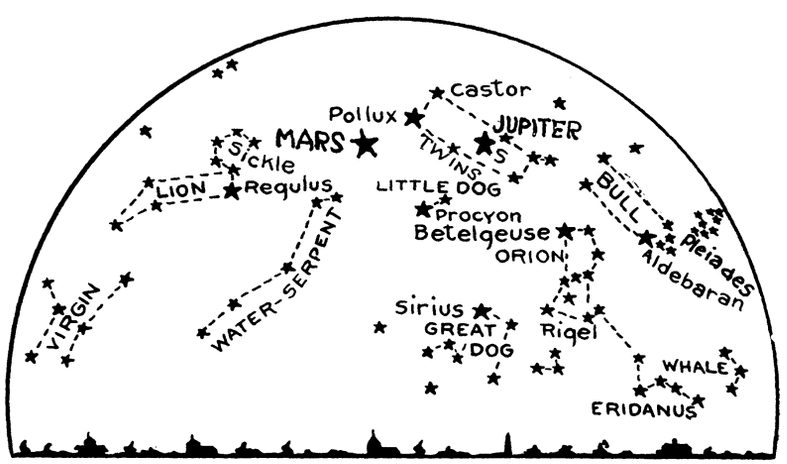


SOUTHERN EVENING SKIES

"sickle" to represent the animal's head. At the end of the sickle's handle, pointing to the south, is the brilliant Regulus.

The planet Jupiter, conspicuous to the naked eye, is even more interesting through a telescope. Most prominent about the planet itself is the system of belts that cross its disc, like the conventional zones on a globe of the earth, made real on the planet. A small telescope, magnifying perhaps fifty times, is required to reveal these.

However, with a still smaller instrument, or even a good pair of binoculars, magnifying eight or ten times, you can see another Jovian feature, its moons. Jupiter has a total of nine satellites, and in this respect is second only to Saturn, which has ten. Five of Jupiter's moons are very faint, ranging between the thirteenth and nineteenth magnitudes, so that large instruments are required to reveal them. But the other four are much more easy to observe, three of them only a little too faint to be seen with the naked eye under the best conditions, that is, of the sixth and sixth and a half magnitude, and the fourth of the seventh magnitude. These are the moons that were discovered by Galileo.

In the summer of the year 1609 this great Italian, with whom modern astronomy really began, heard about a device in Holland that made distant objects appear close. Without receiving any exact description of the instrument, but from his own knowledge of optics, he proceeded to make a telescope, and first displayed it publicly on August 21. Then he made another, and another, gradually increasing in power. He turned these to the heavens and found that the moon was marked with mountains, and with dark areas that he supposed to be seas, and that stars were visible that he could not see with the naked eye. He also noticed that the stars appeared brighter, but no larger, with the telescope than they did with the unaided eye. By the time he came to his fourth glass, and turned it on the planets, he found that they appeared as little moons. That is, they no longer appeared as points of light, but as discs.

On January 7, 1610, came a momentous event. With his fifth telescope, better and more powerful than any of its predecessors, he studied the planet Jupiter. Close to it were three small, bright "stars," one to the west and two to the east. Galileo supposed that they were merely stars that happened to be in the same direction as Jupiter, yet he re-

marked that it was curious that they should all be in line with the planet. The next night he looked at Jupiter again, and was rather startled to find that the three "stars" were all on the west side, and closer together than on the previous night. Still he did not suppose them to be anything but stars, and concluded that the motion of Jupiter was different from what had been supposed, so that the motion of the planet itself had produced the effect.

It was cloudy the next night, so he could not observe, but on the tenth he was again able to look. Now there were only two "stars" and both were on the east! The third, he suspected, was behind the planet. By this time he felt sure that it was the motion of the "stars" and not of Jupiter, that caused the effect. The next night there were again two "stars," both on the east, but the outer of the two was much brighter than the other, although the two seen the previous night had been equal. Then he realized their true character. Here were three bodies that revolved around Jupiter just as the earth and the other planets revolve around the sun, or the moon around the earth.

On the night of the twelfth three again appeared, but one did not become visible until three o'clock in the morning, when it emerged from behind the eastern edge of Jupiter. Then the next night, he saw four "stars" and realized that there were four satellites, or moons, that revolved around Jupiter. The night of the fourteenth was cloudy, but after that, until March 2, he continued his nightly observations, and his original manuscript, recording these observations, together with the diagrams he made of the planet and the satellites, are preserved to this day in Florence, along with the lens of the telescope through which the discoveries were made.

In his magnificent poem, "The Watchers of the Sky," Alfred Noyes has beautifully described the discovery of the moons of Jupiter. Galileo's daughter, the nun Celeste, is speaking:

Late that night
My own dear lord and father came to me
And whispered, with a glory in his face
As one who has looked on things too beautiful
To breathe aloud, "Come out, Celeste, and see
A miracle."
I followed him. He showed me,
Looking along his outstretched hand, a star,
A point of light above our olive trees.
It was the star called Jupiter. And then
He bade me look again, but through his glass.
I feared to look at first, lest I should see
Some wonder never meant for mortal eyes.
He, too, had felt the same, not fear, but awe,
As if his hand were laid upon a veil
Between this world and heaven.
Then . . . I, too, saw,
Small as the smallest bead of mist that clings
To a spider's thread at dawn, the floating disc
Of what had been a star, a planet now,
And near it, with no disc that eyes could see,
Four needle-points of light, unseen before.
"The moons of Jupiter," he whispered low.
"I have watched them as they moved, from night to night;
A system like our own, although the world
Their fourfold lights and shadows make so strange
Must—as I think—be mightier than we dreamed,
A Titan planet."

These four moons that Galileo observed are often called, in his honor, the "Galilean satellites." They have also been given individual names, Io, Europa, Ganymede and Callisto. The latter two are probably about 3200 miles in diameter, but as Callisto is much darker than the others, it is the faintest of the four. Io is a little under 2500 miles in diameter, and Europa about 2000 miles.

The brighest three can be seen with a pair of eight-power binoculars with but little difficulty. The glass must be placed on a firm support, however, as the slightest trembling would make them invisible. A small telescope shows them easily, and through such an instrument you can watch their gyrations, just as Galileo did.

If you do, on the night of March 8 you will see something that would have been even more puzzling if Galileo had seen it on the first nights he observed the satellites. On the night of the eighth, not four, but one, will be visible for a time. At 9:19 P. M., eastern standard time, Io vanishes as it crosses the face of Jupiter. At 9:40 P. M., Europa disappears behind the planet, where it is followed by Ganymede at 10:40. This leaves only Callisto visible until 11:33, when Io reappears as it clears the western edge of the planet. At 2:01 A. M., Ganymede reappears, but by this time Jupiter will be low in the west, for observers in the eastern states, and will be hard to see. At 2:47 A. M., Europa again comes into view. Such a disappearance of all but one of the bright satellites, especially occurring during the evening hours when the phenomenon can be observed, is rather uncommon.

Our own moon, during March, is not entirely devoid of interest. On the night of March 4, or rather, early in the morning of March 5, it occults a fourth magnitude star, beta Virginis. This star is to the west of Spica, about a quarter of the way to the sickle of Leo. Though ordinarily it is easy to see a fourth magnitude star with the naked eye, it is somewhat more difficult when the full moon is close by, so this occultation can best be seen with a small telescope, or a pair of binoculars. At 2:25 A. M., eastern standard time, the star will disappear behind the eastern edge of the moon, to reappear from the western limb at 2:44. At this time, the moon is just past full, so it will be visible all night. On Wednesday, March 11, it is at last quarter, rising at midnight. It is new on the nineteenth, and at first quarter on the twenty-seventh.

*Science News Letter, February 28, 1931*

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Some kinds of catfish swim on their backs.

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Calves kept in a new two-story, steam-heated barn at Cornell University appear to be growing fast and are very healthy.

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A coat of aluminum paint for the interior of ovens has been suggested by Cornell University to increase visibility within the oven.

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In the winter of 1814, London had a fog which condensed upon the grass and trees with a coating like snow about half an inch thick.