ASTRONOMY

Bright Sirius Rules

February's Planets, Mars and Saturn, Set Early; Month is Unusual In That it Has No New Moon

By JAMES STOKLEY

TWO planets can be seen in the February evening sky, if you look early enough. Just as soon as it gets dark, at the beginning of the month, they are visible, close together, in the southwest. They are nearly the same brightness, but one is distinctly red in color. This is Mars. The other is Saturn. Mars passes Saturn on Feb. 2 at 3:00 p. m., Eastern Standard Time, and, after that, appears farther and farther to the east.

Neither of these planets is visible late enough to appear on the accompanying maps, in which the heavens are shown as they are at 10:00 p. m., February 1, 9:00 p. m. on the 15th and 8:00 p. m. on the 28th.

Late Winter Stars

The stars of the late winter evening are all in view, however, with Sirius, brightest star of the night sky, high in the south. Above, and to the right, is Orion, the warrior. The three stars in a row, forming the warrior's belt, make this easy to locate. North of the belt is Betelgeuse, while to the south is Rigel.

About as far to the right of the belt as Sirius is to the left, we find Aldebaran, marking the eye of Taurus, the bull. Still farther over is a little cluster of stars, the Pleiades, often called the "seven sisters." Most people can see only six of the sisters with unaided vision, though a telescope, or even binoculars or opera glasses, reveals many more.

Nearly overhead is another bright star, Capella, in Auriga, the charioteer, while nearby, more to the south, is the figure of the twins, Gemini. This has two bright stars, Castor and Pollux, the latter being the more brilliant. Below the twins is Procyon, in Canis Minor, the lesser dog.

The region of the sky around Orion contains more bright stars than any other similar area of the sky, and to learn these is to make an excellent start towards knowing the constellations. But another of the first magnitude is shining high in the east. This is Regulus, in Leo, the lion, and it stands at the end of the handle of a smaller, unofficial, group, called the "sickle."

Toward the north there are a number of conspicuous stars, though none are of quite the first magnitude. Some of these are the seven that make up the familiar Great Dipper, which hangs in the northeast, with the handle down. In the northwest is Cassiopeia, shaped like a letter W lying on one side.

Parts of the Ship

Low in the south at this time of year appear some stars referred to on the map as Puppis and Pyxis. These are not as bright as those we have mentioned above, and, being so low, they are not very conspicuous. They have an interest, however, because they are part of the huge constellation of Argo, the ship, an important mythological figure, because it is supposed to be the vessel that carried Jason and the Argonauts on their expedition in quest of the golden fleece. It is so big that it is subdivided into four parts, Puppis, the stern, Pyxis, the compass, Vela, the sail, and Carina, the keel. The last named part contains the brightest stars, notably one called Canopus, which do not rise in most of the United States. From the southernmost states, however, Canopus can be seen.

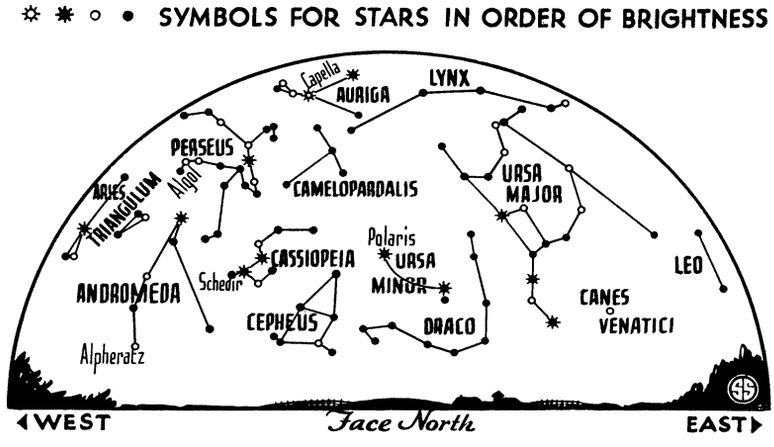
When you look at Sirius, to the south, not only are you looking at the brightest star in the sky (with the exception of the sun) but also one of the nearest. In fact (again excepting the sun) only one star that can be seen with the naked eye is closer. The sun's distance is 92,900,000 miles. As light travels eleven million miles a minute, its illumination reaches us in about eight minutes. But Alpha Centauri, nearest naked eye star, is at a distance of some 25,000,000,000,000 (twenty-five trillion) miles, and its light takes 4.3 years to get to us.

Consequently, to avoid awkwardly large numbers, we say that its distance is 4.3 light years. Sirius is about 9 light years away, so that the light from Sirius that enters your eye tonight left in the good old days of 1929. The distance of nearby Betelgeuse is 112 light years, while Rigel is at a distance of 541 light years. Others, fainter, are at distances calculated in terms of thousands of light years.

The Faint Companion

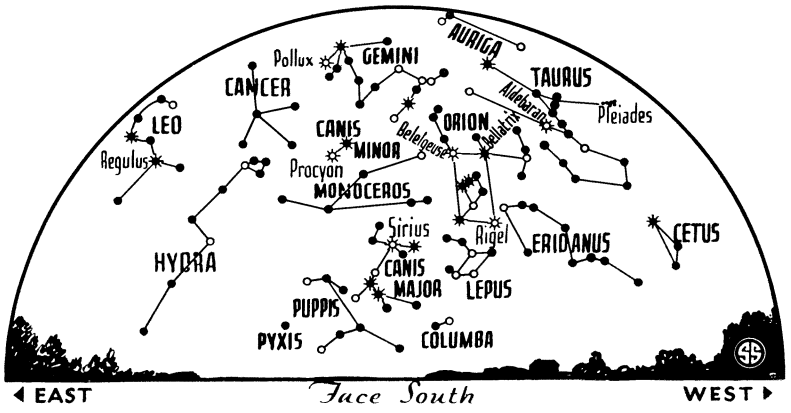
Sirius has another distinction because it is attended by a companion that was discovered before it was seen. Many stars in the sky are double, and the telescope shows that they consist of two separate orbs, revolving around their common center of gravity.

Imagine two heavy iron balls, tied together by a short chain, and thrown through the air. As they fly along, they would turn around a point half way between them, if both have the same weight. In a double star, the force of gravitation is the invisible chain that holds the pair together. All the stars are



CHARIOT IS NEARLY AT ZENITH

In the western sky are the constellations representing proud Queen Cassiopeia, her daughter Andromeda, and the hero-rescuer, Perseus.



SIRIUS HOLDS CENTER OF STAGE

Winter constellations are rich in bright stars, but the February sky is empty of planets except very early in the evening.

moving through the sky, and careful measurements of the position of a double star may show that the center around which they turn may move along a straight line, though the stars themselves swing sometimes to one side and sometimes to the other.

A little over a century ago, a German astronomer, F. W. Bessel, made accurate measurements of Sirius, and found that it was moving in a wavy line, though he could see no other star to balance it. Nevertheless, he fully realized that something must be there, pulling the visible star first one way, then the other, and concluded that it had a massive, though thus far unseen, companion.

Seen With New Lens

It remained for an American telescope maker, Alvan Clark, Jr., of Cambridgeport, Mass., to find this companion. In 1862 his father had just completed a telescope lens, 18 inches in diameter, which is still used at the Dearborn Observatory of Northwestern University.

It was placed in the testing tube in the factory yard one night, and Alvan Senior started to turn it to Sirius, as a handy star on which to try it. The big tube was cumbersome, so he asked his son to point it. Alvan Junior did so, and no sooner did he look than he exclaimed, "Why father, Sirius is double!" Thus, quite by accident, the companion discovered by Bessel was finally observed. Since then, as telescopes have been improved even more, it has been seen many times, and has been found to be of the eighth magnitude.

A star this bright is not ordinarily difficult to see, even with small instruments, but the overpowering glare of Sirius itself obscures it. The companion goes around the main star in an elliptical orbit in slightly less than 50 years. In 1944 the two will be closest together, as seen from the earth.

Same Temperature

As further studies of the two stars were made, astronomers found that they are of practically the same color, which means that they have the same surface temperature, and consequently are giving the same amount of light per square mile. Since they are at the same distance from the earth, this means that the faint star must be vastly smaller than the bright one, scarcely larger, perhaps, than one of the larger planets.

From the way in which the parts of a binary star revolve around each other, it is possible to find their masses, that is, the amount of material that each contains. Thus it was determined that the companion of Sirius has about as much matter as Sirius itself. Being so much smaller, therefore, this means that the density of the companion must be inconceivably great. The old rule, "A pint's a pound, the world around," is approximately true for water. A pint of the companion of Sirius material, however, would weigh some 30,000 times as much, or about 15 tons.

An additional confirmation of this remarkable idea came about 1925 when Dr. Walter S. Adams, director of the Mt. Wilson Observatory, found that the lines appearing in the spectrum of the companion were shifted to the red end more than those in Sirius itself. This was not due to motion of the star away from us, which is often the case, for then both spectra would have shown the same shift.

Instead, it was due to an effect predicted as a result of Einstein's theory of relativity. This is that light radiating from such a dense body loses energy, which loss causes the shift of the lines. The predicted shift was in close agreement with that found by Dr. Adams, and the Einstein theory had another point in its favor.

An inspection of the table of phases of the moon, given below, will show one rather unusual feature—only three are given, instead of the usual four. During February there will be no new moon.

This can happen only in February. The time required for any particular phase of the moon to happen again is about 29.5 days, the so-called "synodic month." Thus, in a 30 or 31-day month there must be a full cycle, with all four phases. But in February, even in a leap year, and especially when only 28 days long, the month is shorter than this cycle. If the new moon comes on the last day of January, which it did this year, the next will not come until 29.5 days later, which brings it to the night of March 1.

Moon Passes Planets

On the afternoon of February 4, the moon will pass Jupiter and Mars, so it will be seen that evening, as a narrow crescent, near these two planets. On the night of the 8th, the moon will pass in front of, or "occult," a fifth magnitude star, called omega Tauri, in the constellation of Taurus, the bull. This will happen around 1:00 a. m., Eastern Standard Time. Perigee, when the moon is closest earth, happens on the 12th, at 1:00 a. m., with a distance of 226,300 miles, while apogee, the moment at which it is farthest, comes at 8:00 p. m. on the 23rd, with 251,400 miles.

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Phases of the Moon

		E. S. T.
First Quarter	Feb. 7	7:32 p. m.
Full Moon	Feb. 14	12:14 p. m.
Last Quarter	Feb. 21	11:24 p. m.

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