ASTRONOMY

Planets Still in Morning Sky

Uranus and Pluto will be at their closest points to earth for 1960 during February. However, only Mercury will be visible in the evening without some kind of optical aid.

By JAMES STOKLEY

IF YOU want to see a planet on February evenings, you will have to use some sort of optical aid except for the brief appearance of Mercury about Feb. 23. The others that are visible to the naked eye are now in the early morning sky.

But two of the more distant planets are now visible in the evening. In fact, during February, they will be at their closest for the year: Uranus, which will be a mere 1,618,000,000 miles away on the eighth; and Pluto, which will be at a little more than three billion miles distant at the end of the month.

While Pluto is so faint—of the 15th magnitude—that a large telescope is needed to reveal it, Uranus is at just about the limit of naked-eye visibility. It is in the constellation of Leo, the lion, and its position is shown on our map of the southern half of the sky by a small "x" after the name Leo, in the southeast. If the night is dark and clear, look at the region with a good pair of binoculars, and you should be able to locate it. Uranus shines with a steadier light than the scintillating stars, and it has a slightly greenish tint. Having located it, you can perhaps pick it up with the naked eye—provided your eyesight is quite good and you are away from the smoke and glare in the city sky.

Mercurial Orbit

Mercury goes around the sun once in 88 days. It moves in an orbit considerably smaller than earth's, which we encircle every 365 days, with the result that it passes our planet every 116 days. About 22 days before this happens, it is at its greatest distance east of the sun. It thus remains visible above the western horizon for a little while after sunset. Conditions for seeing it are most favorable when such a "greatest eastern elongation" occurs near the beginning of spring (March 20 in 1960), so this should be a good time to view it.

Look for Mercury low in the west for a few days around Feb. 23, after the sun has gone down and twilight is fading. By the time the sky is entirely dark, the planet also will have set.

The other planets that can be seen with the naked eye are all in Sagittarius, the archer, which is in the southeast a little before sunrise. Brightest of these is Venus, which rises an hour or so ahead of the sun. On the morning of Feb. 17 it will be close to Mars, which is only about a hundredth as bright. In the western part of Sagittarius, so that it rises about three hours ahead of the sun, is the second brightest planet, Jupiter, about a sixth as bright as Venus. Saturn, which is fainter, but still about twice as bright as Mars, is farther east, and will be close to Venus on Feb. 7.

The stars of February evenings are shown on our maps. These give the appearance of the skies at about 10 p.m., your own kind of standard time, at the first of February; 9:00 p.m. in mid-February and eight o'clock at the end.

Sirius, in Canis Major, the great dog, is the brightest of these. Others that are bright enough to be classed as first magnitude are: Capella, in Auriga, the charioteer, high overhead; Betelgeuse and Rigel in Orion, the warrior, in the south; Aldebaran, in Taurus, the bull, high in the southwest; Pollux, in Gemini, high in the south; Regulus, in Leo, the lion, in the east; and Procyon in Canis Minor, the lesser dog, below Gemini.

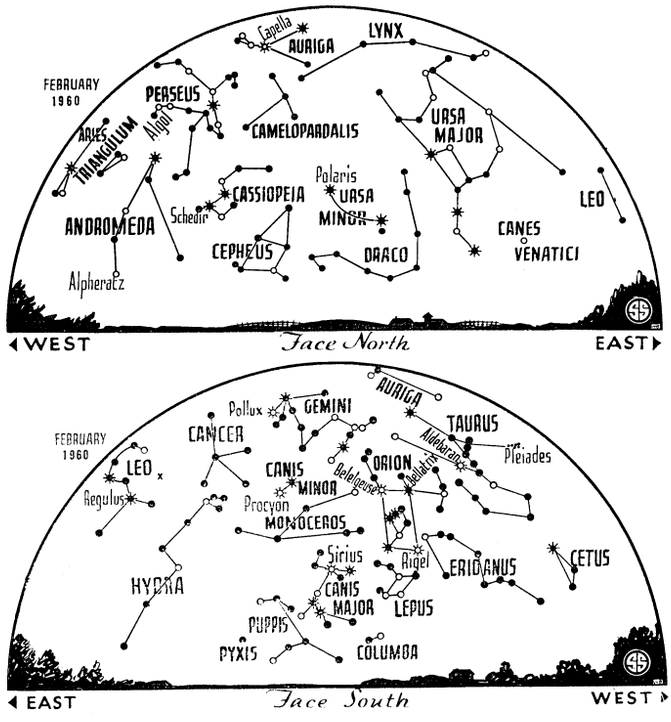
In the constellation of Taurus, to the right of the V-shaped group of stars in which Aldebaran stands—and which marks the bull's face—is a little cluster of fainter stars called the Pleiades. These have an important place in mythology, and are often called the "seven sisters," but ordinarily only six stars are visible with the naked eye. Through a small telescope more than a hundred stars can be seen, while a photograph taken through a large one shows thousands.

But a longer exposure, through a really big instrument, brings out something else: nebulous clouds around many of the stars. Analysis of the light from these clouds shows it to be the same as the light from the stars themselves; that is, it is reflected starlight.

In nearby Orion, between Betelgeuse and Rigel, are three stars in a row that mark the warrior's belt. Hanging from it, as pictured on old star maps, is his sword, in which is a star called theta Orionis. It is too faint to be shown on our maps, but it is just above the one between the belt and Rigel marked with the open circle, iota Orionis. On a clear dark night, you can easily see theta, and you will probably find that it seems a little blurred. Through a telescope you can see a beautiful lake of light, while photographs bring out greater detail. This is the "great nebula in Orion" and it has been observed since the earliest days of telescopic astronomy.

Nebula's Light

The light of this nebula, too, has been analyzed, with the aid of the spectroscope. It turns out to be quite different from that of the nearby stars. There are bright lines in its spectrum, which show light coming from glowing gases, such as hydrogen, helium, nitrogen and oxygen. Associated with these gases are clouds of dust. Part of the Orion nebula itself is hidden by obscuring clouds, and a short distance away, near the star Alnitak, easternmost of the



✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

three belt stars, is a very famous dark nebula, with the shape of a horse's head.

The Orion nebula is an example of one that shines by emission of its own light, while that around the Pleiades merely reflects the star light falling on it. It is the temperature of the associated stars that determines which kind it is.

The Pleiades are relatively cool, as stars go, with surface temperatures of around 20,000 degrees Fahrenheit. Theta Orionis is much hotter—approximately 60,000 degrees Fahrenheit. Since it is so hot, much of its radiation is in the invisible ultraviolet range. As these rays shine on the hydrogen and other gases in the nearby clouds, electrons are knocked out of their normal places in the hydrogen atoms. Then the electrons fall back to their normal places, and light is emitted. This is the process of fluorescence, familiar in fluorescent lamps.

But the cooler Pleiades yield radiation of much lower energy, which is incapable of displacing the electrons in the gas clouds. All that we can see is the star light reflected from the clouds of dust. And even in the emission nebulae, like Orion, there is some reflected star light, although it is largely overpowered by the fluorescence.

Celestial Time Table for February

Feb.	EST	
4	9:27 a.m.	Moon at first quarter.
6	12:08 a.m.	Algol (variable star in Perseus) at minimum brightness.
7	1:00 a.m.	Moon farthest, distance 251,700 miles.
8	2:00 p.m.	Uranus opposite sun and nearest earth; distance 1,618,000,000 miles.
	8:57 p.m.	Algol at minimum.
12	12:24 p.m.	Full moon.
16	10:00 p.m.	Venus passes Mars.
19	6:48 p.m.	Moon in last quarter.
21	7:00 p.m.	Moon passes Jupiter.
22	10:00 p.m.	Moon nearest, distance 228,400 miles.
	11:00 p.m.	Moon passes Saturn.
23	7:00 p.m.	Mercury farthest east of sun, visible for a few days about this date low in west after sunset.
24	7:00 a.m.	Pluto opposite sun and nearest earth, distance 3,050,000,000 miles.
26	1:53 a.m.	Algol at minimum.
	1:24 p.m.	New moon.
27	7:00 p.m.	Moon passes Mercury.
28	10:43 p.m.	Algol at minimum.

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

Science News Letter, January 23, 1960

Do You Know

Forest *trees* are just about as efficient as crop plants such as corn, wheat and sugar beets when it comes to converting the energy in sunlight to plant materials.

Birth rates during the last decade in the United States, Canada, Australia and New Zealand have been about one-third greater than those recorded just prior to the second World War.

About one out of every seven human beings lives in *India*.