ASTRONOMY

Venus Still Brightens

Winter constellations now beginning to appear. Stars are classified by their apparent brightness into magnitudes, the difference between each magnitude being 2.5.

By JAMES STOKLEY

➤ WITH THE coming of December, the planet Venus is more conspicuous than it has yet been on this appearance and shines brightly in the southwestern evening sky.

It is now so bright, of magnitude minus 3.6 on the astronomical scale, that it can be seen long before the sky is completely dark, and before any other star or planet comes into view.

Venus sets, however, a little too soon to be depicted on the accompanying maps. These show the appearance of the heavens at about 10:00 p.m., your own kind of standard time, at the first of December, an hour earlier in the middle, and two hours earlier at the end.

Venus is in Capicornus, the sea-goat, which is just below the constellation of Aquarius, the water-carrier, shown low in the southwest.

In this same part of the sky there is another planet, Mars, which is shown, though it is only about a seventy-fifth as bright as Venus.

High in the south, however, there shines the planet Jupiter, which is second brightest, since it is more than a quarter of the brilliance of Venus. This is shown on our map in Aries, the ram, and its brightness makes it easy to locate.

Winter Constellations Appear

In the southeast we can now see that brilliant array of stars that make the winter evening sky so glorious. Brightest of these is Sirius, the dog-star, in the figure of Canis Major, the great dog.

Directly above is Orion, the warrior, easily identified by the three stars in a row that form his belt. Above and to the left of the belt is Betelgeuse, while below and right we find Rigel.

A little to the left of the lower part of Orion we see Canis Minor, the lesser dog, with the star Procyon. Directly over this group Gemini, the twins, can be seen. This is a constellation containing two rather bright stars, Castor and Pollux. The latter is of the first magnitude.

Going upward from Orion, one comes to Taurus, the bull, with Aldebaran, distinctly red in color, to mark the eye of the beast. To the left of Taurus stands Auriga, the charioteer, with the star Capella as the brightest in the constellation.

Aside from these stars in and around Orion, there is only one other of the first magnitude that is shown, and that is so low that it appears considerably fainter. This is Vega, in Lyra, the lyre, near the northwestern horizon.

Because of the low altitude, its light has to pass through a much greater length of atmosphere than when it was high overhead. This absorbs much of its light and makes it appear faint, so it is shown with the symbol for one of the second magnitude.

In addition to Venus, Jupiter and Mars, the other two naked-eye planets may also be seen, though much later at night. Saturn, in the constellation of Virgo, the virgin, rises about 3:00 a.m. at the beginning of December and about 1:00 a.m. at the end.

Stars' Brightness Differs

On the 18th, Mercury is farthest west of the sun, then rising about an hour and three quarters before sunrise. For a few days around this date, it can be glimpsed near the southeastern horizon as dawn is breaking.

Looking at the night-time sky, one cannot fail to notice that, as Paul wrote to the Corinthians, "one star differeth from another star in glory." Some are bright, some are faint, and with the aid of telescopes, we can observe others much too dim to be seen at all with the unaided eye.

Of course, there are two reasons for the seeming differences in the brightness of the stars. Some really are many times brighter than others. In addition, they are at widely separated distances.

The brightest of all the night-time stars, Sirius, for example, is actually not very brilliant as stars go, even though it does exceed the sun some 26 times. It happens to be very close, and that is why it looks so bright. In contrast, Rigel, the lower bright star in Orion, is about 14,700 times as bright as the sun, but it is about 62 times as far away as Sirius, which makes it look fainter.

Hipparchus First to Classify

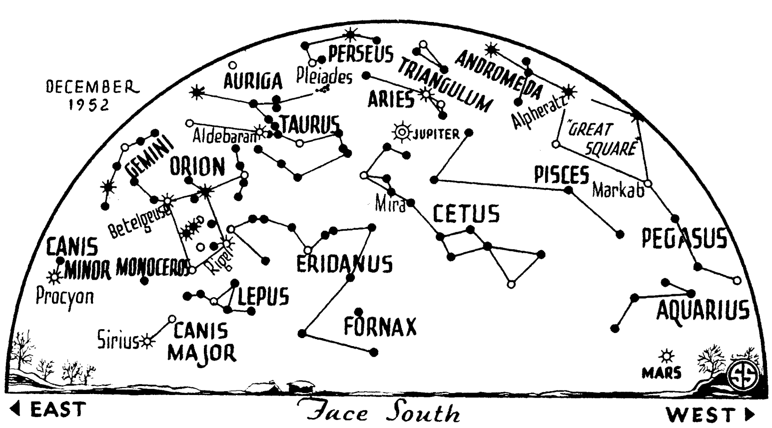
About 150 B. C., a Greek astronomer named Hipparchus classified the stars by their apparent brightness into six "magnitudes." Some 20 of the most brilliant he lumped together as the first magnitude. The vast number that could barely be seen he called sixth magnitude, while those of intermediate brightness he put into the second, third, fourth and fifth.

A century ago, utilizing newly invented instruments which made it possible to measure star brightnesses with greater accuracy than ever before, an English astronomer named Pogson put the magnitude system on a more scientific basis than it had been previously.

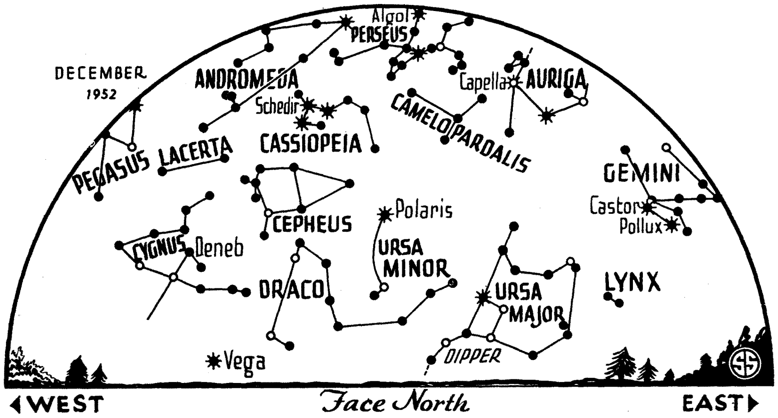
He set the difference between one magnitude and the next at 2.5 or, more accurately, 2.512. This was about the ratio that Hipparchus had happened to choose, and so meant the least alteration in the old system. But also, with this ratio, a difference of five magnitudes is exactly 100. Thus a first magnitude star is just 10 times as brilliant as one of the sixth magnitude.

Decimal Magnitudes

To take care of differences in brightness smaller than this ratio, decimal magnitudes are used. That of Pollux, for example, is 1.21, but that of Castor, also in Gemini, the twins, is 1.58, which is nearer to two, so it is called second magnitude.



☼ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



There was a question, however, as to how to handle much brighter stars, like Sirius, which is 11 times as bright as a star of magnitude 1.0. Since the brighter the star, the lower is the magnitude number, it was necessary to go to numbers lower than unity, that is, to zero and still farther down to minus numbers.

Thus, the magnitude of Sirius is minus 1.58. This system makes it possible to go down far enough to include the sun, whose magnitude is minus 26.84, which means that it is about 63,000,000,000 times the brightness of a typical first magnitude star. Among the stars shown on our maps of the December skies, Capella may be taken as a star of zero magnitude, since it is 0.21. The middle star of the belt of Orion, sometimes called Alnitak, is 1.8, so that is close to being a typical star of the second magnitude.

Sixth Magnitude Visible

A star of magnitude 3.0 is zeta Tauri, which is the one in the constellation of Taurus shown at the end of the line extending eastward from Aldebaran. The two stars just below Aldebaran are of fourth magnitude.

Although under good conditions, such as a dark, clear sky far away from city lights, one can see stars down to the sixth magnitude with the naked eye, these maps do not show those fainter than fourth. With big telescopes, of course, much fainter stars may be detected.

The 200-inch Hale telescope at the Palomar Observatory in California will photograph stars down to the 22nd magnitude. Probably it would be possible to see a star as faint as the 20th magnitude by looking through that instrument.

Celestial Time Table for December

Dec.	EST	
1	7:41 a.m.	Full moon.
6	3:09 a.m.	Algol (variable star in Perseus) at minimum brightness.
7	10:00 p.m.	Moon farthest, distance 251,300 miles.
9	8:22 a.m.	Moon in last quarter.
11	8:47 p.m.	Algol at minimum.
12	early a.m.	Meteors visible radiating from constellation of Gemini.
	3:17 p.m.	Moon passes Saturn.
14	5:37 p.m.	Algol at minimum.
15	8:53 a.m.	Moon passes Mercury.
16	9:02 p.m.	New moon.
18	5:00 p.m.	Mercury farthest west of sun, visible before sunrise for a few days around this date.
19	4:00 p.m.	Moon nearest, distance 227,000 miles.
20	2:38 a.m.	Moon passes Venus.
	9:21 p.m.	Moon passes Mars.
21	4:44 p.m.	Sun farthest south, winter commences in northern hemisphere.
23	2:51 p.m.	Moon in first quarter.
29	1:42 a.m.	Algol at minimum.
31	12:05 a.m.	Full moon.
	10:31 p.m.	Algol at minimum.

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

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INVENTION

Typewriter Paper Kept Straight by Patent Device

➤ PARALLEL BARS evenly spaced on a typewriter's platen and parallel rings around it at each end enable the typewriter operator to be sure that his paper is in straight at all times. Inventor is Carlos C. Goetz, New York, and patent number is 2,618,372.

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