ASTRONOMY

Bright Stars in Winter Skies

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By JAMES STOKLEY

➤ TO SEE any planets during December you must look either early or late in the evening. As during the past month, no naked eye planet remains visible during the whole of the evening, and once again no planet appears on the accompanying maps. These show the heavens as seen from the latitude of the United States about 10:00 p.m. (your own kind of standard time) at the beginning of December, 9:00 p.m. on the 15th and 8:00 p.m. at its close.

Brightest of the stars shown is Sirius, the dog-star, of the constellation of Canis Major, the great dog. This stands low in the southeast and is one of the brilliant group of constellations that make the stars of the winter evenings so conspicuous. Directly above Sirius is the most familiar of all—Orion, the warrior, with the three stars in a row that mark his belt, according to the pictures on the old star maps. Above the belt is Betelgeuse and below it is Rigel.

Among the Higher Stars

Still higher is Taurus, the bull, with first-magnitude Aldebaran. Next to this group—to the left—is Auriga, the charioteer, in which Capella shines. Below him we find the twins, Gemini, with Castor and Pollux. The latter star ranks as first magnitude, but the former is a little fainter. And between Gemini and Canis Major there is Canis Minor, the lesser dog, with the star Procyon.

Looking toward other parts of the sky we see Cygnus, the swan, low in the northwest. The star Deneb is at the top of a part of this constellation known as the northern cross. Nearby, close to the horizon as seen on the maps, is Vega, in Lyra, the lyre. In the early evening, at the beginning of December, these figures are much higher and seen to better advantage. At 8:00 p.m. on Dec. 1, for instance, the heavens appear as they were shown on November maps.

High in the west, resting on one corner, is the great square, in the constellation of Pegasus, the winged horse. Extending higher from the uppermost star in the square is Andromeda, the chained princess. In this, on a dark clear night, you can see a hazy spot of light which is the great galaxy in Andromeda. This is another star system like that which makes up our whole Milky Way, and of which the sun is part, but at a distance of about 800,000 light years. That is, travelling 186,000 miles every second, the light from this vast swarm of stars takes 800,000 years to reach us

Venus at Sunset

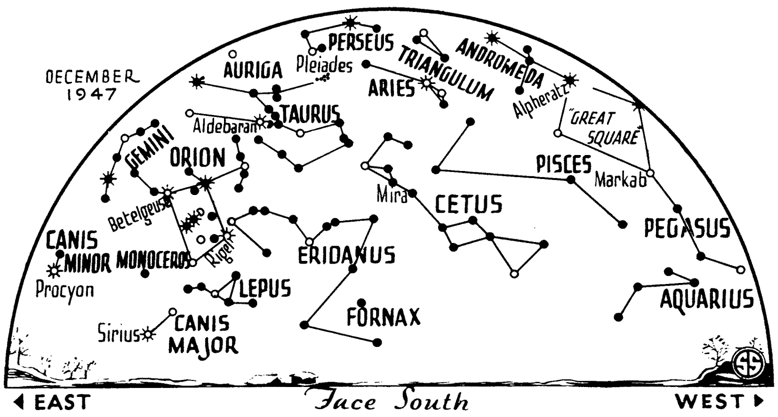
Coming now to the planets, which are dark bodies like the earth, revolving about the sun, we can see Venus low in the southwest just after sunset. A morning star, visible before sunrise during the earlier part of the year, it has swung to the other side of the sun, and is now an evening star. During the coming months it will set later and later, continually increasing in brightness until it reaches its maximum on May 18.

Mercury and Jupiter this month are both too near the sun to be seen, but a little before midnight Mars and Saturn appear above the eastern horizon in the constellation of Leo, the lion. At the beginning of December, Mars is seen very close to the star Regulus, though it is about 90% brighter, while Saturn is about three degrees (or six times the apparent diameter of the full moon) toward the west. Its position changes very slowly, but Mars is moving eastward. At the middle of the month Regulus just about bisects the line between them. On Dec. 1 the two planets are about the same brightness, but both are now increasing. However, the increase of Mars is more rapid. By Dec. 31 it is about 50% brighter than Saturn—and three and a third times as bright as Regulus.

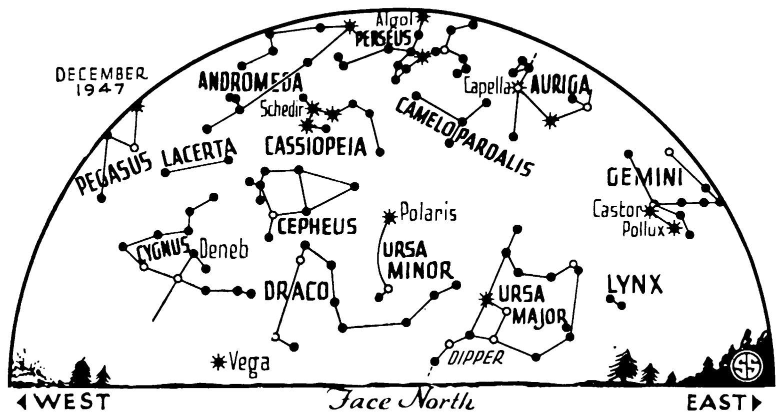
Greatest Optical Feat

Though the year now coming to a close brought an unusually good total eclipse of the sun, a number of comets and other celestial happenings, perhaps it will be best remembered in astronomical history as that which marked the completion of one of the greatest optical feats ever attempted — the world's largest telescope mirror. But completion of the mirror—200 inches in diameter—to the exquisite degree of accuracy which such a piece of glass requires, marks only the end of one stage in a still larger project. The mirror has just been hauled on special trucks from Pasadena, where it was ground and figured, up the road to Mt. Palomar in southern California, where it will be placed in the huge telescope mounting which has been waiting for several years to receive it.

This telescope, built with Rockefeller money furnished through the International Education Board, goes back to 1927. In that year, lecturing before the Astronomical Society of the



☼ ✱ ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



Pacific in Los Angeles, Dr. Francis G. Pease announced the practicability of such an instrument. A member of the Mt. Wilson Observatory staff, he had designed the 100-inch telescope there which is still the world's largest in operation. But even more responsible for the actual completion of the instrument was Dr. George Ellery Hale, organizer and first director both of the Yerkes and Mt. Wilson Observatories. He wrote an article, "The Possibilities of Large Telescopes," which appeared in Harpers Magazine in April, 1928. With the aid of copies of this article he secured the necessary financial backing for a 200-inch instrument.

Scientists Called on for Aid

Then studies were made of the best design for such an instrument, as well as the most favorable location. Experts in optics and in engineering were called in for help. It was necessary to make the enormous disk required for the mirror, which took 20 tons of glass. This was cast at the Corning Glass Works in 1934. Actually the one that has been used was the second, for there was an accident in the pouring of the first disk which made it necessary to do it over again. The mounting for this mirror, with moving parts weighing about 425 tons, yet operating with the precision of a fine watch, was too big for any telescope maker. Instead, it was entrusted to the Westinghouse Electric Corporation, and built in their turbine plant near Philadelphia.

During 1948 the Mt. Palomar Observatory, part of the California Institute of Technology and with the 200-inch telescope as the main instrument, will come into operation. With it astronomers will reach out farther into space, to observe twice as far as we can at present. The 100-inch instrument can reach to a distance of about 500,000,000 light years, while the farthest galaxies that the 200-inch can photograph will be so distant that their light would take a billion years to reach us. Also, faint nearer objects will be observed better.

The main value of such an instrument is that it gathers more light than smaller telescopes, and not that it magnifies more. Irregularities in the atmosphere, even from the most favorable location, set a limit to the extent of magnification. This means, in general, that it will not show the moon or planets any better than the 100-inch does at present, since they have plenty of light already.

Studying the Galaxies

An important application will be in studying the galaxies, like that in Andromeda, which can be faintly seen these December evenings. Before the 100-inch was built astronomers were divided as to what this and similar objects really were. Photographs with the 100-inch showed the individual stars of which it consists, and one other was resolved with the same telescope. These will be seen still better now, and so will others more distant, so no one can say what new discoveries the 200-inch will bring. Certainly it will tell us a lot more about this universe in which we live.

Time Table for December

Dec.	EST	
1	5:00 a.m.	Jupiter in same direction as sun
3	8:36 a.m.	Moon passes Saturn
	6:52 p.m.	Algol (variable star in Perseus) at minimum brightness
4	7:55 p.m.	Moon in last quarter
12	early a.m.	Meteors of Geminid shower appear to radiate from the constellation of Gemini
	7:53 a.m.	New moon
14	2:34 p.m.	Moon passes Venus
16	1:00 p.m.	Moon farthest, distance 252,200 miles
18	2:58 a.m.	Algol at minimum
20	12:43 p.m.	Moon at first quarter
	11:47 p.m.	Algol at minimum
22	11:43 a.m.	Sun farthest south, winter begins in northern hemisphere, summer in southern
23	8:36 p.m.	Algol at minimum
26	5:25 p.m.	Algol at minimum
27	3:27 p.m.	Full moon
28	6:00 p.m.	Moon nearest, distance 223,000 miles
30	3:38 p.m.	Moon passes Saturn
31	5:34 p.m.	Moon passes Mars

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

Science News Letter, November 29, 1947

Lumber from *aspen* trees, *Populus tremuloides* to botanists, is now more widely used than before the war because of the large demand for lumber; it is a soft wood, easily worked, with a fine, uniform texture.

Throughout the world, over 20,000 different *trees* are useful to man.