ASTRONOMY

See Fall Constellations

Some characteristic fall constellations are visible in the southern sky during October, which also brings an unusual solar eclipse visible only from Antarctica.

By JAMES STOKLEY

➤ ALTHOUGH the autumn skies do not have the brilliance of those of winter, there are some interesting and characteristic constellations which now shine in the south.

These appear on the accompanying maps, which depict the skies as they appear about ten o'clock, your own kind of standard time—add one hour for daylight saving time—at the first of October; nine o'clock at the middle of the month and eight o'clock at the end.

High in the southern sky are the four stars marking the great square in Pegasus, the winged horse. Actually, only three of these are in Pegasus; Alpheratz, the one in the upper left-hand corner, is in the neighboring group of Andromeda, the chained lady. Diagonally opposite is Markab, which is in the horse's neck, as the figure was drawn on the old star maps.

The row of stars extending downward and to the right from Markab form the head. The stars extending westward from the upper right-hand corner are his forefeet, for the animal is shown upside-down!

If you follow downward the line of the right side of the square, you will come to a bright star, low in the south, which is called Fomalhaut, and is part of Piscis Austrinus, the southern fish. This is about as high as it ever gets, in our northern latitudes.

That is why it is represented by the symbol for a second-magnitude star, even though it is of the first magnitude, according to the system whereby the astronomer reckons star brightnesses. Because it is so low, its light has to pass through a greater thickness of the earth's atmosphere than if it were higher in the sky.

The symbols on our maps show the stars as they appear and they are only shown with their full brightness when they are fairly high.

Constellations of the Zodiac

Just below the square we find Pisces, the fishes, which is one of a row of constellations extending diagonally across the southern sky, down to the southwestern horizon. The others are Aries, the ram; Aquarius, the water-carrier; Capricornus, the sea-goat, and Sagittarius, the archer.

These are constellations of the zodiac; another is Taurus, the bull, low in the northeast. Beyond Sagittarius, and visible earlier in the evening than the times for which the maps are drawn, is Scorpius, the scorpion, also a zodiacal constellation.

The zodiac is the path through which the sun, moon and planets seem to move, and at present Venus is in Scorpius. It sets, at the beginning of October, about an hour and three-quarters after the sun, but by the end of the month it remains above the horizon for nearly two and a quarter hours after sunset.

Of magnitude minus 3.7, Venus is far brighter than any other star or planet, so there is no difficulty in finding it.

Another planet, Saturn, is in the same part of the sky. Although of the first magnitude, it is less than a sixtieth as bright as Venus. At the beginning of October, Venus is to the west of Saturn. Moving eastward, it passes Saturn on Oct. 20.

The other naked-eye planets (Mercury, Mars and Jupiter) are now all so nearly in the same direction as the sun that they are not visible.

Returning to the stars, we find that some of the brightest of those now visible appear to the right of Pegasus. High in the west is Cygnus, the swan, with first-magnitude Deneb. Just below this star is Vega, in Lyra, the lyre. To the left of Lyra is Aquila, the eagle, with the star called Altair.

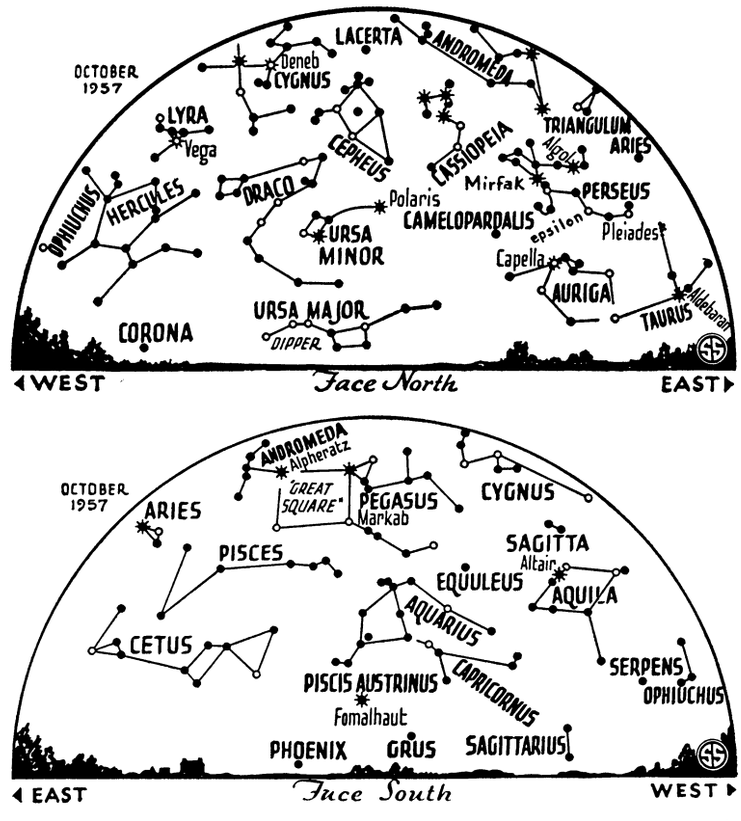
Now moving over to the east we find, near the horizon at the map-times, brilliant Capella, in Auriga, the charioteer. To the right is part of Taurus, the bull, with a reddish star called Aldebaran. Both of these belong to that brilliant array of stars which will be so prominent to the south during winter evenings.

On the celestial program for October there is an eclipse of the sun, but almost the only people to see it will be the members of the scientific parties located in Antarctica, making observations in connection with the current international Geophysical Year.

An eclipse of the sun occurs when the moon passes between sun and earth, so that the lunar shadow falls on our planet.

This shadow has two parts: the umbra, or inner shadow, where the moon completely hides the sun, and the outer penumbra, from which the lunar disc would only partially cover the sun's face. Where the umbra reaches, an eclipse is total; from the penumbra only a partial eclipse may be observed.

During the night of Oct. 22, by U. S. time, most of Antarctica, the southern tip of Africa, and the southernmost parts of Madagascar and New Zealand, as well as a large portion of the Indian Ocean, will be covered by the penumbra, so that a partial eclipse of the sun will be observed from these regions.



The umbra, however, will just graze the earth's atmosphere, barely touching it along the Antarctic coast, near Halley Bay, where a British expedition is located. Scientists there will be able to take advantage of this opportunity for some unique observations, if the weather is clear; if it is not, the eclipse should still be useful.

One important phase of the IGY program is concerned with the ionosphere, the layer of the atmosphere that reflects radio waves back to the ground, and is affected by the sun's radiation. When the moon cuts this off, important observations are expected.

Without traveling to Antarctica, anyone who can see the evening skies in October will be able to see another eclipse—not once but several times. This will be of the star called Algol, in the constellation of Perseus, the champion, which is seen in the northeast, just above Auriga.

Algol, also known as beta Persei, is the second brightest star in this constellation; the brightest is Mirfak, a little to the left. Ordinarily, Algol is of magnitude 2.06, while Mirfak is 1.80, or about 25% brighter.

Below Algol (under the letter P in Perseus) is the star called epsilon Persei, of magnitude 2.88, and Algol is about twice as bright.

However, if you look at these stars at about 9:07 p.m. on the evening of Oct. 18, you will find that their order of brightness has changed, and epsilon is about 50% brighter than Algol, which is now only a third as bright as it is normally. On the evenings of Oct. 19 and 20, Algol will shine with its normal brightness, but on the 21st, 2.87 days after its previous diminution in brightness, it will again have faded.

Actually, Algol is not a single orb, but consists of two stars revolving around the center of gravity of the pair. There are many binary stars of which this is true, but with an eclipsing binary the plane of revolution is nearly in line with the earth, and one star is much fainter than the other.

Thus, every 2 days 20 hours 49 minutes, the dark component of Algol passes partially in front of the bright one and produces an eclipse, which dims its light. It takes about ten hours for the complete passage of the dark star.

Celestial Time Table for October

Oct.	EST	
5	12:00 noon	Jupiter behind sun.
	5:00 p.m.	Moon farthest, distance 252,200 miles.
8	4:42 p.m.	Full moon (Hunter's Moon).
13	3:30 a.m.	Algol at minimum.
16	12:19 a.m.	Algol at minimum.
	8:44 a.m.	Moon in last quarter.
18	9:07 p.m.	Algol at minimum.
20	7:00 a.m.	Venus passes Saturn.
21	8:00 a.m.	Moon nearest, distance 224,400 miles.
	5:56 p.m.	Algol at minimum.
22	11:43 p.m.	New moon; total eclipse of sun, visible from Antarctica.
25	10:47 p.m.	Moon passes Saturn.
26	10:17 a.m.	Moon passes Venus.
30	5:48 a.m.	Moon in first quarter.

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

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GEOPHYSICS

"Hams" Track Satellites

➤ RADIO "HAMS" and other volunteers have been asked to help track the earth satellites to be launched next spring as part of the International Geophysical Year, or IGY.

The U. S. National Committee for the IGY said the amateur radio tracking program will be known as "Moonbeam." The visual tracking program by volunteers is known as "Moonwatch."

Under the Moonbeam system, amateur radio groups will locate the satellites as they circle the earth some 200 to 1,500 miles from its surface and will receive scientific data transmitted from them. The Naval Research Laboratory heads the project, with assistance from the University of California's Jet Propulsion Laboratory.

The American Radio Relay League, to which most "hams" belong, supports the program. Moonbeam volunteers will use a simplified version of the primary Minitrack system. Both systems, developed at the Naval Research Laboratory, involve tuning in on the radio signals broadcast from the satellites at 108 megacycles for tracking and recording scientific data.

The simplified version is known as Minitrack Mark II. The Jet Propulsion Laboratory has developed a second system, Microlock, for receiving the radio signals.

Cost of both systems is expected to be within reach of interested amateurs.

Information turned in by Moonbeam volunteers will be of particular importance in detecting small deviations in the satellite's orbit due to local irregularities in gravity and in recording scientific data that might be telemetered from the satellite at the time of a solar flare.

The main Minitrack stations, all of which are expected to be in operation by the end of September, will stretch along a line from Blossom Point, Md., to Santiago, Chile, except for one in Australia and one in California. Each is estimated to cost about $120,000, not including personnel.

Moonbeam teams may also make important contributions to the IGY program by helping to locate the satellites initially; by providing additional data on the effects of the ionosphere, the electrically charged layers of the upper atmosphere, on radio signals; by providing time and position checks for the primary recording of data from certain satellite experiments; and by providing data if the satellite is seriously damaged, should this occur.

Requests for information concerning the Moonbeam program should be addressed to the Satellite Office, IGY Committee of the National Academy of Sciences, Washington, D. C.

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Lithium, a silvery-white metal which reacts with air, is about half as dense as water; its compounds are used in high-temperature greases, ceramics, metallurgy and atomic energy work.