ASTRONOMY

Planets Return

Jupiter and Saturn Shine in Evening; Venus and Mercury May Be Glimpsed at Sunset; Autumn Arrives

By JAMES STOKLEY

DURING the summer months Jupiter has been the only planet visible in the evening, but during September two other of these bodies that, like the earth, revolve around the sun and form the solar system, are coming into view. Jupiter is still visible in the southwest, in the constellation of Ophiuchus, the serpent bearer, and its great brilliance, more than that of any star or other planet in the vicinity, makes it easy to find. Venus is brighter, but is closer to the sun, and only remains visible for about an hour after sunset. However, there should be little difficulty in finding it in the gathering dusk, especially at the end of the month. On September 4 little Mercury, which is rarely seen because it always remains close to the sun's glare, will be in the same region, but greatly inferior in brilliance, so rather difficult to find.

Saturn, however, is easily seen, and its position is shown on the maps. It stands in the direction of the constellation of Aquarius, the water carrier. On September 11 it will be directly opposite the sun, rising at sunset and setting at sunrise, so that it will be visible the entire night. Then it will be closer to the earth than at any other time of the year, only 800,965,000 miles away. It is also at its brightest, with a magnitude of 0.8, inferior to Jupiter or Venus, but as brilliant as most of the stars. It will be slightly brighter than Altair, the brilliant star in Aquila, the eagle, in the southwest.

No Light Of Their Own

The planets have no light of their own, but are made visible by the light of the sun that they reflect to us. The stars, on the other hand, are distant suns, millions of times farther away than our's, and shining by their own glow. Vega, high in the west, is the most brilliant of these that are visible in September evenings. Vega is in the constellation of Lyra, the lyre. Directly overhead is the northern cross, part of Cygnus, the swan. First magnitude Deneb, at the top of the cross, is towards the northeast. These two, with Altair, make a large right triangle in the sky that is a good group to learn.

Another easily recognized group is visible to the east—the great square of Pegasus, the winged horse. The square now seems to rest on one corner. Low in the southeast can be seen a single brilliant star, Fomalhaut, about all that can be found, from the United States, of Piscis Austrinus, the southern fish. The familiar Great Dipper, part of Ursa Major, the great bear, is found to the northwest, and next to it, to the left, is Boötes, supposedly driving the two bears in their constant circuit of the sky. In this is the bright star Arcturus.

Herald of Winter

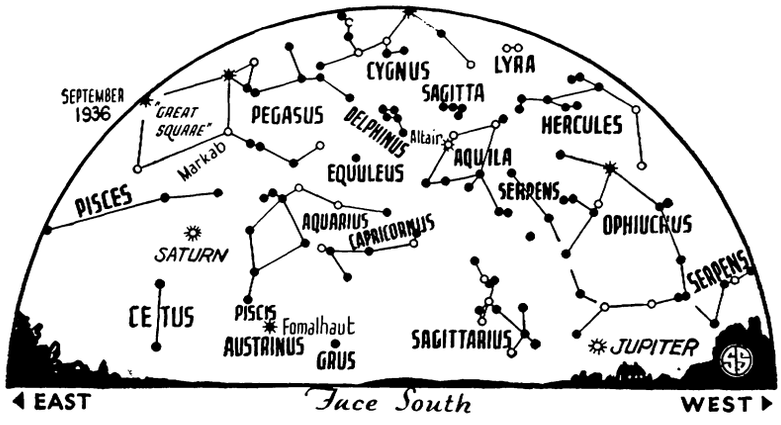
Low in the northeast appears Capella, part of Auriga, the charioteer. This is a group that occupies a prominent position in the evening sky of winter, and its entrance on the celestial stage next month is a herald of the brilliant stars that come into view at the end of the year.

Ever since June 21 the sun has been moving southward in the sky, and this month it reaches the halfway point. On Wednesday, September 23, at 12:26 a.m., eastern standard time, it crosses the celestial equator, which goes through the sky directly over the earth's equator. The passage is called the autumnal equinox, and it marks the beginning of autumn. Supposedly, at this time the day and night are of equal length because then the sun rises directly east, sets directly west, and is above the horizon for just half of the 24 hours.

Visible After Setting

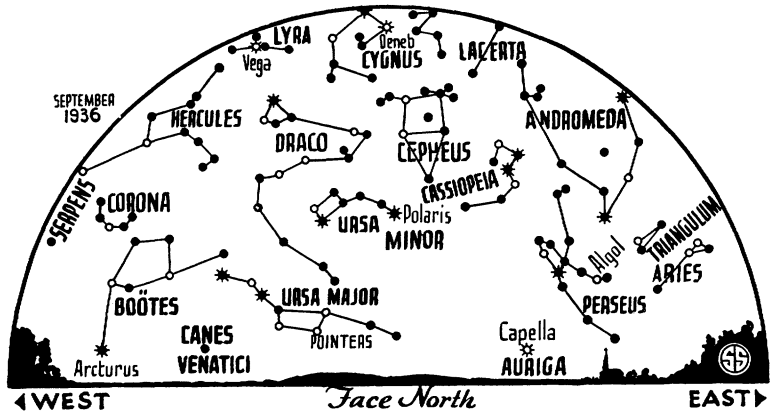
But this is not really the case. As the light of the sun passes through the atmosphere, it is bent downwards, and this has the effect of making any heavenly object, unless it is directly overhead, appear a little higher than it actually is. This effect is greatest for an object close to the horizon, for then its light passes through the greatest length of atmosphere, and the apparent lifting is a little more than the sun's diameter. Consequently, after the sun is entirely below the horizon, its light is bent around the curve of the earth's surface, and we continue to see it for a short time. In the same way, it is seen in the morning before it really has risen.

All this means that on the 23rd the sun will be above the horizon longer than it will be below. At latitude 40 degrees, on this date, the sun begins to appear about 5:47 a.m., local time, and completely hides behind the western horizon at 5:58 p.m. Thus, the day is about ten minutes longer than 12 hours, the night is a corresponding period



SHINING ALL NIGHT

Saturn rises at sunset then rides the sky until dawn. You can easily see it for it is brighter than most of the stars.



BRIGHTEST STAR

This month the honor is held by Vega in the easily found triangle of stars high overhead.

shorter, and the day is 20 minutes longer than the night. Not until the middle of October will the day and night be approximately equal.

At the time of the equinox, nowadays, the sun stands in the direction of the constellation of Virgo, the virgin, a group that we saw in the evening sky of early summer. But many thousands of years ago it stood at this time in the neighboring group of Libra, the scales, and it has been stated by some authorities that this figure was selected for these stars because they symbolized the supposed equality between daylight and darkness at this time of year. In very much the same way, the constellation of Leo, the lion, symbolized the power and glory of the sun, because it stood in that direction when at its highest, at the beginning of summer.

Harvest Moon

From about the 22nd, a day before the moon reaches first quarter, to the end of the month, the evenings will be moonlit. On September 3, at 4:00 a.m., the moon will be in perigee, or nearest the earth, at a distance of 224,700 miles. Its greatest distance of the month, "apogee," the astronomer calls it, will come on the 18th, at 8:00 p.m., when it will be 252,350 miles away. On September 22, the moon, just a day before first quarter and visible as a very full crescent, will pass Jupiter, about two and a half times its own diameter to the south. This will happen at 3:06 a.m., eastern standard time, when neither the moon nor Jupiter will be visible from most of the United States, but on the evening of the 21st the two bodies will be seen close together.

The full moon on September 30, is known as the "harvest moon." On that night, at latitude 40 degrees north, it rises only 32 minutes later than the night before. In contrast, the full moon on March 8, rose nearly an hour later than it did on the 7th. This means that moonlit evenings continue for a longer period after full moon at this time of year, and this is supposed to be of help to the farmers in gathering their harvest. In latitudes farther north, the effect is much greater. At 60 degrees north, for instance, the moon rises only 10 minutes later on the 30th than on the 29th, though on March 8 it rose one hour 18 minutes later than on the 7th.

The moon will be at last quarter on Sept. 7 at 10:14 p.m., eastern standard time, new on Sept. 15 at 12:41 p.m., at first quarter on Sept. 23 at 5:12 p.m., and full on Sept. 30 at 4:01 p.m.

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SEISMOLOGY

4,000 Earthquakes a Year Is Average for Japan

FOUR thousand earthquakes a year! This is the average number of perceptible ones for all Japan. It is small wonder that that country has proved a fruitful laboratory for seismologists.

Recently the Earthquake Research Institute of the Imperial University of Tokyo, Japan, held an exhibition of instruments, apparatus, maps, diagrams, statistics, etc., commemorating the tenth year since the establishment of the Institute and the fifty-fifth year since the organized study of seismology began in Japan.

In 1880, the Seismological Society of Japan was organized by American, English and Japanese scholars in Yokohama and Tokyo for the study of conditions preceding, accompanying, and following earthquakes. One of them, Sir James Alfred Ewing, later a principal of Edinburgh University, invented a horizontal pendulum seismograph in cooperation with Thomas Gray, who added a heavy bob suspended by a spiral spring with which to record vertical motion. The instrument which they worked out has been the model for seismographs ever since.

Dr. Mishio Ishimoto, director of the Institute, is the inventor of a number of instruments to aid in the study of earthquakes, chief among them being the tiltgraph and the accelerograph. With the tiltgraph, which has now been in use for eight years, it has been possible to prove the truth of the proposition of T. Terada, C. Tsuboi, and N. Miyabe, that the crust of the earth (at least in Japan) is composed of blocks. These blocks appear to be several miles in diameter; a general upheaval of the ground is produced by the combined motion of the blocks.

Movement Under Crust

As for the cause of an earthquake, while some scientists hold that it originates from a pair of sliding "faults," or deep crustal cracks, the findings of the Japanese scholars indicate, rather, a movement of the magma, or plastic matter, under the crust of the earth. Mr. Tanahashi of the Kobe Marine Meteorological Observatory, who is interested in the motions which initiate earthquakes, in the pushing waves and the pulling waves, has made a study of the distribution of initial motions; and he finds that a quake may start from several points at the same time, as, for example, in the deep-seated earthquake of June 2, 1931, when the source of motion was quadruple.

Inasmuch as Japan is traversed by six earthquake zones and has in the past 340 years suffered from 27 major earthquakes which took the lives of 161,822 people, it is to be expected that that country should be particularly interested in earthquake prediction. But, although statistics have proved the correlation between quakes and barometric pressure, its gradient, precipitation, tides, etc., these are only the trigger; and as the late Dr. Suyehiro remarked, "An unloaded gun cannot be fired by pulling the trigger." Part of the task ahead is to learn when the gun is loaded, and with what.

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