

ASTRONOMY

Four Planets Shine

November's Display Is Best in More Than a Year; Venus, Mars, Jupiter and Saturn Seen After Sunset

By JAMES STOKLEY

WITH FOUR bright planets shining in the evening sky this month we have the best display of these brother and sister worlds of the earth since early last year. Then, it will be recalled, all five that can be seen with the naked eye were lined up at once in the west. This month there is no such striking line-up, and Mercury is not visible with the others. But the rest, Venus, Mars, Jupiter and Saturn, can all be seen in the sky from about one to three hours after sunset, and they are all unusually bright.

Venus, most brilliant of all, with magnitude of minus 4, is the first to appear, low in the southwest, in the constellation of Sagittarius, the archer. This is not, by the way, shown on the accompanying maps, as they are adjusted for later in the evening. They show the skies of 10 p.m. Nov. 1, and 9 p.m. at the middle of the month. Venus sets about three hours after the sun, which is earlier, but it can easily be located because of its splendor.

Mars, now receding from earth after its close approach last month, is getting fainter than it was. However, of the magnitude minus 1.5, it is still exceedingly bright, and you can easily see it, with characteristic ruddy glow, in the south in the figure of Pisces, the fishes.

Saturn Rises at Sunset

Directly opposite the sun on Nov. 17, Saturn rises at sunset and is visible through the night. Its magnitude is minus 0.1, fainter than the other three planets, but brighter than most of the stars. Its location, in Taurus, the bull, to the southeast, is shown on the map.

Jupiter, in brightness, is second only to Venus this month. Its magnitude is minus 2.3. It rises about an hour after sunset, in Taurus, the bull.

Although Mercury, sole remaining planet that becomes visible to the naked eye, is not in this party, it will appear this month as a morning star. On Nov. 11 it is farthest west of the sun, and

rises well before sunrise. For a few days around that date, it will be seen low in the southeast as dawn is breaking. In brightness it will then be slightly superior to Saturn.

With the stars this month, we can begin to see the glorious figures that shine so brilliantly in the wintertime. Orion, the warrior, is low in the east. The three stars of his belt form a vertical row. Above him is Taurus, the bull, with ruddy Aldebaran, and Capella, in the figure of Auriga, the charioteer. And north of Orion you can begin to see the twins, Gemini.

To the west, Altair, in Aquila, the eagle; Deneb, part of Cygnus, the swan; and Vega, of Lyra, the lyre, which we have enjoyed during recent months, are slowly descending and will, a few months hence, be gone from the evening sky. The great dipper is now right on the northern horizon, its poorest evening position of the year, but M-shaped Cassiopeia, the queen on her throne, rides high above the pole star.

Telescope Provides Interest

To anyone able to look at the heavens through a small telescope, this month offers many interesting sights. Venus, for instance, though it looks like a bright star to the unaided eye, with a relatively small instrument is revealed in a crescent phase, like that of the moon several days after new. Venus does undergo phases, like those of the moon, and for the same reason. Illuminated by the

sun only, one hemisphere is lighted, the other is dark. When the entire sunlit half is turned to us, we see a full moon, or a "full" Venus. But now Venus is swinging between us and the sun, so that only a small section of the bright half is visible from earth. Hence, the crescent phase. However, even the telescope fails to show any detail on Venus, since it is continually covered with white clouds, which perpetually hide the planet's surface.

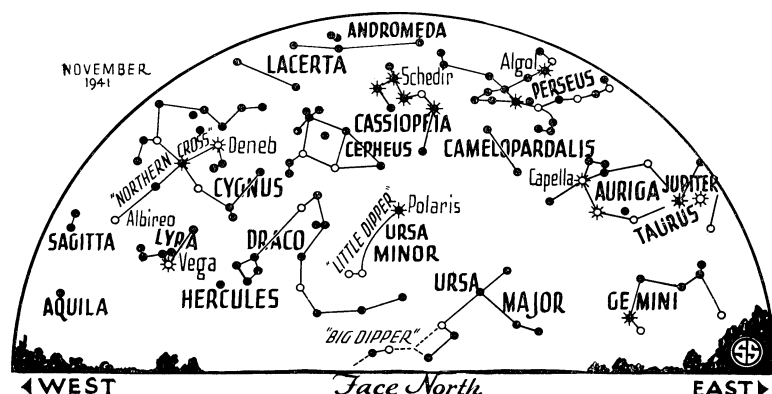
Though Mars is not handicapped by such a cloud layer, it is rather disappointing, even through a big telescope. However, it is possible to see dark markings, which are permanent, and sometimes white areas around the poles, probably regions of ice and snow, which change with the Martian seasons.

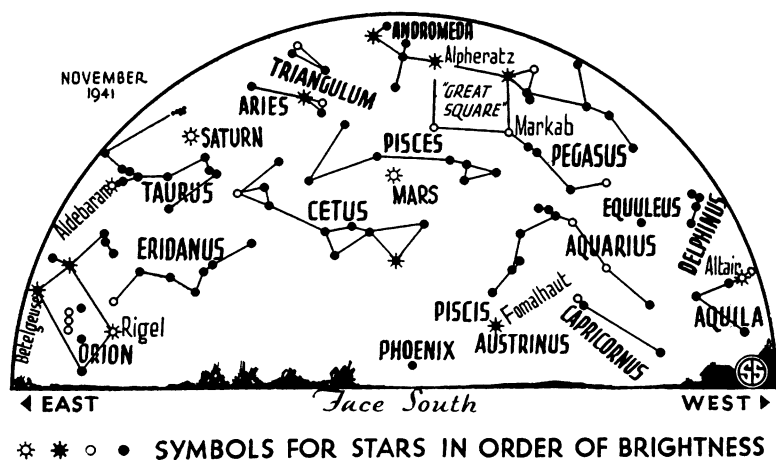
Jupiter's Belts Visible

Jupiter, largest of the planets, is also continually covered with an atmosphere, though this presents interesting color changes. This atmosphere consists of methane and ammonia, and contains clouds of the same gases, in the form of frozen particles. These show up, through a telescope, as belts, parallel to the planet's equator.

Jupiter's four bright moons are also of interest through the telescope, as they are constantly disappearing and reappearing. Sometimes they are eclipsed, as they penetrate Jupiter's shadow. At other times they are occulted, hiding behind the planet. Or they may vanish in transit, as they pass directly in front of Jupiter. Of nearly the same color as the planet, they are then quite invisible.

Late on the night of Nov. 23 a busy





program is laid out for these moons. At 11:48 p. m., E. S. T., on the 22nd, satellite III, which is called Ganymede, will be eclipsed as Jupiter's shadow engulfs it. At 1:16 a. m., II, Europa, will disappear in a similar way. At 2:38 a. m., I, known as Io, will be out of sight when it starts a transit in front of the planet. This will leave only satellite IV, Callisto, visible until 3:54 a. m., when Ganymede will emerge from behind Jupiter. At 4:42 a. m., Europa will return to view, followed six minutes later by the reappearance of Io, after which all four moons will again be visible. Io will then be seen on the western side of the planet, the others to the east.

And also in the evening sky is Saturn, whose rings are probably the most interesting sight of all to most observatory visitors. Now they are very well seen. These rings consist of a vast swarm of tiny moons. In addition, Saturn has nine other moons, two short of Jupiter's total of 11. But the Saturnian moons are not as easy to see, and they are not eclipsed nor occulted.

Our own moon, also, is taking part in an occultation this month. On Nov. 6, two days past full, it will pass in front of the bright star Aldebaran,

in Taurus. As seen from Washington, the star will be hidden at 6:02 a. m., E. S. T., and will reappear at 7:03 a. m. Farther west, it will happen earlier, long before dawn. At a selected point in northern California, for which calculations have been made, the star will hide at 2:07 a. m., P. S. T., and will reappear at 2:51 a. m., P. S. T. This is one of a series of occultations of this star occurring this year.

Celestial Time Table for November

Saturday, Nov. 1, 9:35 a. m., Moon passes Mars. **Monday, Nov. 3,** 9:00 p. m., Full moon. **Wednesday, Nov. 5,** 1:50 a. m., Moon passes Saturn; Noon, Moon farthest, distance 252,500 miles. **Thursday, Nov. 6,** Early morning, Moon occults Aldebaran. **Friday, Nov. 7,** 2:57 a. m., Moon passes Jupiter. **Tuesday, Nov. 11,** 10:00 p. m., Mercury farthest west of sun; 11:53 p. m., Moon at last quarter. **Sunday, Nov. 16,** Early morning, Meteors of Leonid shower visible. **Monday, Nov. 17,** Noon, Moon passes Mercury; 2:00 p. m., Saturn opposite sun and nearest earth with distance of 756,300,000 miles. **Tuesday, Nov. 18,** 7:04 p. m., New moon; 9:00 p. m., Moon nearest, 221,700 miles distant. **Saturday, Nov. 22,** 5:23 a. m., Moon passes Venus; Midnight, Venus farthest east of sun. **Tuesday, Nov. 25,** 12:52 p. m., Moon in first quarter. **Friday, Nov. 28,** 5:10 p. m., Moon passes Mars.

Eastern standard time throughout.

Science News Letter, October 25, 1941

peller situated at the tip of the tail.

This new design with the engine inside the fusilage and propeller in the rear, with no projections or obstructions permits a far higher degree of streamlining than is possible with a flying boat of the usual type, which has an elevated wing and motors in the wing. In landing or starting, the whole tail including engine and propeller is lifted clear of the waves. Another feature of the design is that it provides a step on the under surface of the fusilage when the tail is lifted, which step completely disappears when the tail is lowered for normal flying, and thus avoids the formation of undesirable eddy currents.

Science News Letter, October 25, 1941

Bacterial War on Beetle

A NEW method of germ warfare against the Japanese beetle, which has so ravished our fruits, vegetables, trees and flowers, is the invention of Samson R. Dutky of Moorestown, N. J., Patent 2,258,319, who has assigned his patent rights to the U. S. Government without any payment of royalties to himself.

Instead of poisons or poison gas, Mr. Dutky compounds an insecticide of ground up bacteria of the kind that produce an ailment known as milky disease in the larvae of the Japanese beetle and related insects. The bacteria are mixed with an inert substance, chalk, marble dust, or similar powder, in such proportion that each ounce of the powder contains 30 billion of the deadly spores.

The insecticide can be diluted with water to use as a spray, or mixed with solid materials and applied directly on the ground or mixed with the soil.

The bacteria used belong to the groups *Bacillus popilliae* and *Bacillus lentimorbus*.

Science News Letter, October 25, 1941

INVENTION

Plane That Lifts Its Tail Brings Patent To German

AN AIRPLANE that lifts its tail like a bird when it sits down on land or water is among 858 inventions granted U. S. Patents recently.

The plane, of truly revolutionary design, is the invention of Claude Dornier, famous German airplane designer, who

was awarded U. S. Patent 2,257,940.

The whole rear is carried on a hinge in such a way that it can be lifted to a high angle. This rear end also carries the entire power plant, the usual vertical fin and rudder, the horizontal tail planes and elevators, and a pusher pro-

RESEARCH

Research Job For Defense Used 150 Scientists

ONE of the most extensive jobs of scientific research in the defense effort took 150 different physicists from 25 different universities to the Massachusetts Institute of Technology's Radiation Laboratory to work on "a highly confidential and important subject with the greatest possible speed," President James Bryant Conant of Harvard, Chairman of the National Defense Research