

ASTRONOMY

Watch For the Leonids

Astronomers Are Making No Promises, But if Events Of 33 Years Ago are Repeated You May See Hundreds

By JAMES STOKLEY

THE LEONID shower of meteors, or shooting stars, is one of the principal events on the celestial program for November, but the astronomers who specialize in the study of these bodies are properly very cautious about making any definite promises as to what may happen on the night of November 16, when most are apt to be seen. This is the way the matter stands. In 1799, 1833 and 1866, brilliant showers of these meteors were seen in November, thousands an hour. In November of other years a few were seen, all seeming to radiate out of the constellation of Leo, the lion, which rises in the northeast this month about midnight.

From these observations, astronomers came to the conclusion, now universally accepted, that there is a vast swarm of these tiny bodies, which are not stars at all, but bits of cosmic dust and other debris left over from the formation of the solar system, or perhaps the remains of a comet. This swarm is shaped like a ring, pulled out into an ellipse, and surrounds the sun, approaching closer at one point than at another. This ring crosses the earth's orbit at the point that our planet occupies in mid-November, so that every year we encounter some of the meteors.

Not Uniform

But they are not uniformly distributed around the ring. At one place they are much more concentrated, and this cluster takes about 33 years to travel once around the circuit. In 1799, 1833 and 1866 the earth encountered the large swarm, and a fine display of celestial fireworks was the result. Consequently it was expected that 1899 would bring a return engagement. This, however, did not come true, and in November of 1899 and 1900 there were fewer meteors than in November of an ordinary year, when a shower was not expected. It was shown later that this was because of the gravitational pull of the giant planet Jupiter. This body had passed close to the center of the swarm

a few years earlier, and had pulled them aside, so that they missed the earth.

Last year it was time for them again. There was some reason for supposing that in the intervening third of a century, Jupiter might have repaired its damage, by switching the swarm back again into its old orbit, and so astronomers watched, and waited. In 1930 and 1931 there had been fairly good displays. The year 1932 had not been so promising, but it was good enough to keep up hopes. But last year was a disappointment, very much like 1900.

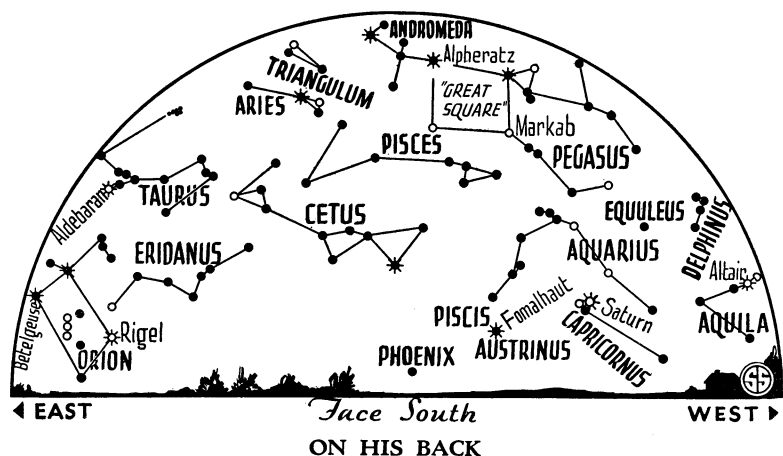
Unusual Display?

With this history, you may wonder why anyone should expect any kind of a display in 1934. The reason is that the unfortunate years of 1899 and 1900 were preceded by fairly good showers in 1898, and followed by a good one in 1901, even though they came nowhere near the great shower of 1833. It seemed as if Jupiter had only switched aside the center part of the great swarm, and that the very first section of it, and the stragglers at the end, had continued in their former courses. Thus, if the events of 33 years ago are repeated, this November may bring quite a good shower.

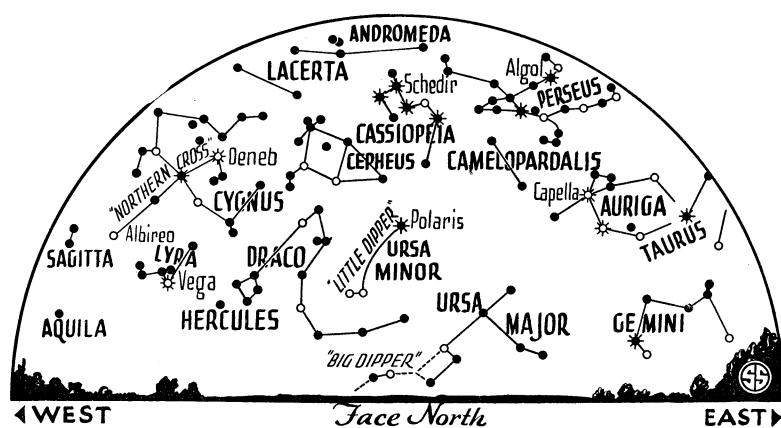
Unfortunately, meteor observation is a sport that requires late hours. The earth turns on its axis in the same direction—counter clockwise, as seen from a point high above the north pole—as it turns around the sun. When it is between sunset and midnight we are on the rear quarter of the earth, and those meteors that we see then have to catch up to us. Between midnight and sunrise we are on the advancing section of the earth, and then we meet the meteors head on. In just the same way, when walking along a crowded street, you pass more people going the opposite way than going your way, because all the latter are travelling along with you.

So, if you want to see some of these meteors, get up for a little while in the early morning hours of Thursday, November 15, Friday the 16th and Saturday the 17th, and look to the north-eastern sky. There you will see the constellation of Leo, in which is the familiar group of stars called the sickle, from the center of which the Leonid meteors seem to radiate. On an ordinary night you might see two or three meteors each hour, but on these nights, particularly the second, you should see many hundred in the same time. Of course, it is better if you can get away from the city, where the dust and glare prevent your seeing the fainter ones. The moon is at first quarter on the evening of the 13th, so it will set soon after midnight on the meteor nights,

✧ * ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



Lying low in the eastern evening heavens is the famous warrior Orion with the three stars in a vertical row forming his belt.



BRIGHTEST IN NORTHERN SKY

You can easily locate the beautiful Vega in Lyra, the lyre, and above her Deneb, marking the top of the Northern Cross.

and its glare will not be disturbing. If you want to make some scientific observations, count the total number of meteors that you see during each half hour period, and send records, together with notes of any particularly interesting features, to Dr. Charles P. Olivier, at the University of Pennsylvania's Flower Observatory, Upper Darby, Pa. As president of the American Meteor Society, a nation-wide group of amateurs, Dr. Olivier is particularly interested in gathering such data.

Out of Leo

The reason that the meteors all seem to radiate out of Leo, from whence comes their name, is that they are moving around the sun in parallel paths, and enter the earth's atmosphere the same way. These paths seem to converge in the distance, like the tracks of a railroad. Their orbits correspond very closely with the orbit of Tempel's comet, which has not been seen for many years. It is supposed that the meteors are the remains of the comet.

While you are up in the early morning, you will be able to see the red planet Mars, also in Leo, to the east of Regulus, the star at the end of the sickle's handle. It rises soon after one o'clock. Perhaps you can also, towards the end of the month, see Jupiter low in the eastern sky before sunrise.

On November 20 the moon hides, or "occults," several of the brighter stars in the Pleiades, the little cluster in the constellation of Taurus. This happens in the evening and early morning, and would be a most interesting spectacle were it not for the fact that the moon is then almost exactly full. Because of the glare it will be rather difficult to see

these faint stars, except with telescopic aid. The moon passes Saturn on the night of November 14, so on that evening the two bodies will be seen close together in the southern sky.

In November, Orion, the mighty warrior of the sky, again appears in the evening. This constellation, most brilliant in the sky, can be seen low in the east, as shown on the accompanying maps. These show the appearance of the heavens at 10 p. m. on November 1, 9 p. m. on November 15 and 8 p. m. on November 30. The warrior is on his back. The three stars forming his belt are in a vertical row. Betelgeuse, to the north, rather reddish in color, marks one of his shoulders, and Bellatrix, above and farther south, the other. Rigel, brilliant star to the south of the belt, is in one of his feet.

The old star maps represented Orion as defending himself from charging Taurus, the bull, which can now be seen above him. Almost directly over Bellatrix, not quite as far as the distance between Betelgeuse and Rigel, is a star distinctly ruddy in color. This is Aldebaran, marking the Bull's eye, and it is in a V-shaped group of fainter stars, called the Hyades, that outline the animal's face. Still higher is a little cluster of faint stars, the Pleiades, famous "seven sisters" of mythology.

Sky Twins

Low in the northeast you can see the twins, Gemini, with the more brilliant Pollux below, and Castor, his brother, above. Over them, about half way to the zenith, is Capella, in Auriga, the charioteer. The Great Dipper, this month, is seen near the horizon in the north, as low as it ever gets. The two pointers, the stars in the bowl farthest

from the handle, indicate the direction of the pole-star above. Higher than the pole-star, about as far above it as the handle of the dipper is below, is Cassiopeia, the queen, seated on her throne.

South of this lady, and directly overhead, is her daughter, Andromeda. This figure extends to the northeastern corner of a square of fairly bright stars, seen high in the south, and called the great square in Pegasus, because the other four stars are in that constellation, representing a winged horse.

Saturn In Southwest

In the southwest this month can be seen the planet Saturn, distinguishable from the stars by its brilliance greater than any of the nearby stars. Left of Saturn appears Fomalhaut, brightest star in Piscis Austrinus, the southern fish. Directly west shines Altair, in Aquila, the eagle. Altair can be recognized because it is attended on either side by a fainter star.

In the northwest shines the brightest star to be seen in the northern half of the sky, Vega, in Lyra, the lyre, and above it is Deneb, in Cygnus, the swan. This group is sometimes called the Northern Cross, Deneb marking the top of the cross, which is now standing in an erect position.

The moon is new on November 6 at 11:44 p. m., E. S. T., at first quarter on November 13 at 9:30 p. m., full on November 20 at 11:26 p. m., and at last quarter on November 29 at 12:39 a. m. It is at perigee (nearest earth) on November 12, 9:00 a. m., 229,750 miles distant, and at apogee (farthest from earth) on November 27, at 9:00 a. m., 251,380 miles distant.

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ZOOLOGY

Tuberculosis Found In Wild Moose

A RARE case of animal tuberculosis was found at Balaryd, in the Swedish province of Smaland, where a wild moose was recently ordered killed by the local sheriff. The animal, looking weak and emaciated, had repeatedly come out of the forest and kept close to a gang of workmen building a road. One day the moose lay down on the road, and was unable to rise again. It was then shot. The carcass was examined and it was found that the animal suffered from tuberculosis in a very advanced stage.

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