ASTRONOMY

Star Gazers Ready to Watch Famous Meteor Shower

Leonids, to Fall Friday and Saturday, May be More Numerous Presaging a Great Shower in 1933 or 1934

By JAMES STOKLEY

STAR gazers who are particularly interested in meteors, or "shooting stars," prepare for a busy time. Next week brings one of the most famous of meteor showers, and though it is not as dependable as the shower in August, the most famous of all meteoric displays have been of the November meteors. These were the great showers of 1799, 1833 and 1866, when the sky was covered with meteors like the ribs of a great umbrella. A similar shower was expected for 1899, but it failed to materialize.

There is some reason to believe, however, that 1933 or 1934 should bring a return. If so, they should now be getting more numerous than in recent years, and so astronomers, as well as the active group of amateurs who help them observe meteors, will be anxiously watching the sky this month, noting the numbers of shooting stars that appear on certain particular nights, and the way they move. No great astronomical knowledge is required to assist in this work, so if you want to engage in a simple bit of research that will be a real help to science prepare to look for meteors late at night next Friday and Saturday, November 14 and 15.

Seem to Come From One Point

This shower is known as the Leonid shower of meteors, because they all seem to radiate from a point called the radiant in the constellation of Leo, the lion. Leo does not rise until late, but if you look to the northeast at midnight, you will see the familiar "Sickle." The handle of the sickle points to the east point of the horizon, and the blade points upwards. The radiant of the Leonid meteors is in the curve of the blade. Actually, the meteors do not radiate from this point; it is an effect of perspective that makes them seem to do so. Imagine that you are looking into a long, well-lighted, railroad tunnel. The tracks, and all the other lines parallel to them, seem to come together in the distance. It is just the same with the meteors. They are moving in parallel tracks, and when we look in the direction from whence they come these tracks also seem to come together.

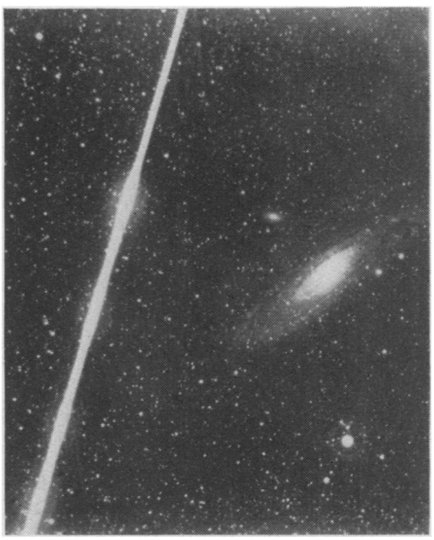
Dr. Charles P. Olivier, professor of astronomy at the University of Pennsylvania, and leading meteor authority, gives some facts about the Leonid meteor stream in his new book, "Comets," just published by the Williams and Wilkins Co. The stream forms an ellipse 1,900,000,000 miles long, or about twenty and two-thirds times the distance from the earth to the sun. This ellipse has an eccentricity of .9, which means that its length is 2.29 times its width.

Analogy of the Inner Tube

"Let us take the inner tube of an automobile tire and bend it into such an ellipse," says Professor Olivier in this book. "Put the sun at one focus, and have the diameter of the tube equal to the distance that the earth goes in passing through the stream each November, making due allowance for the crossing not being at right angles. Now consider the tube sparsely filled with meteors, all moving in the same direction, and taking 33¼ years to make a complete journey from perihelion (the point nearest the sun) to perihelion again. But for a part of this stream, of such length that it takes three years to pass the earth's orbit as it comes towards the sun, the meteors are much more closely packed, and in the very middle of this 'three year section' packed very closely indeed.

"The earth passes through this tube about the middle of each November, usually meeting only the sparsely scattered Leonids. But at 33- or 34-year intervals it goes through the dense part and for three or four years we have much finer showers. And if, as in 1799 and 1833, the earth happens to hit the very dense part,—the 'gem of the ring', as it is sometimes called—then we have a grand meteoric shower."

However, at some times when there should have been a shower, none occurred, as in 1899. Professor Olivier explains this by saying that "as the group which should have met us in 1899 was on its way Jupiter happened to be in the part of its orbit very near the meteors' orbit." The result was that the gravitational attraction of Jupiter, largest of all the planets, pulled them towards himself, and so switched the main stream aside sufficiently to cause it to miss the earth, as it passed us in 1899. By 1901 Jupiter had moved on and so the tail end of the main stream did reach the earth, giving us "quite a respectable, if not brilliant, shower in November of that year."



PATH OF A METEOR

Joseph Klepesta was making a celestial photograph at the Prague Observatory in Sept., 1923, when a meteor sped across in front of his telescope. Thus he accidently took this remarkable picture. The bulges in the trail were caused when the meteor flashed out somewhat more brightly than usual for a moment.

Cautious Prediction

Professor Olivier is properly cautious about predicting another brilliant display in 1932, 1933 or 1934, remembering the failure of the 1899 display to live up to predictions, and the "black eye" that was thus given astronomy in the public estimation.

"It all depends," he says, "upon the perturbations suffered by the main groups of Leonids in the past thirty-three years. No one appears to have attempted to calculate these perturbations, which present a most troublesome problem. So far as an off-hand opinion goes, the main stream meantime may have been switched either towards or from us. In the first case we should see

a really fine shower, in the latter next to nothing. We simply do not know yet what to expect." These meteors are really part of a comet. In 1866, a European astronomer, named Tempel, discovered a comet which has since borne his name. The orbit of the comet is almost the same as that of the meteor swarm, and so it seems quite certain that the meteors are the debris of the comet.

Even more marked is the relation between a second meteor shower of November and another comet, for when the comet disappeared, it left a meteor shower in its place. These meteors are called the Andromedes, because they radiate from the constellation of Andromeda, and occur between November 17 and 27. They are not very numerous now, however, though several brilliant showers have been recorded.

But the Leonid shower is something else, and it is in their observation that the amateur can help. Watch the northeastern sky on the night of Nov. 14 and 15, especially after midnight. The greatest display comes between 3:00 and 4:00 a. m. The moon will be just past last quarter and will shine rather brightly in the eastern sky, so that fainter meteors may be lost in its glare. But if you look carefuly, you should be able to count ten or so an hour under ordinary circumstances, and perhaps many more if we are beginning to get into the main swarm of the Leonid stream. If possible, draw the path of each meteor among the stars, but if you don't want to do that, count the total number of meteors in half hourly intervals. Send any records of the meteors to Dr. Charles P. Olivier, Flower Observatory, Upper Darby, Pa., to whom they will be most welcome.

Science News Letter, November 8, 1930

PSYCHOLOGY

Fewer Trials for Negro Children But Whites Excel in Speed

NEGRO children, when given a test of learning to associate certain numbers with letters as in a code, were able to learn in fewer trials than those required by white children, but the white children excelled in speed.

The trial was made by Prof. Lyle H. Lanier, of Vanderbilt University at Nashville, who gave individual tests to nearly 500 12-year-old white and negro children in three typical cities: Nashville, Tenn.; Chicago, Ill.; and New York City. Full details of the study are reported in a current issue of *Comparative Psychology.*

Science News Letter, November 8, 1930

ARCHAEOLOGY

84-Year Old Man is Master Maker of Stone Age Tools

Taught by Studying Ancient Evidence Indians Left, He Has Made Thousands of Arrow Heads and Scores of Axes

THE "LOST ART" of manufacturing flint arrow points and granite hammers, like those used by ancient and primitive men, has been successfully revived by a modern hunter, according to a report from Beloit Museum, Beloit, Wis., by Alonzo W. Pond, archaeologist.

For years, the report states, Halvor Skavlem has studied the evidence afforded by the good and rejected stone weapons lying about the Indian village site at his summer home on Lake Koshgonong. Seventeen years ago he first attempted to shape a bit of flint into an arrow point, using a pointed bone for a tool as he imagined an Indian hunter would have done.

A good many archaeologists and amateurs have made such experiments as this first one, the report points out, but Mr. Skavlem has "revived the art for he has made thousands of arrowheads and scores of axes in the past seventeen years, using only the tools available to primitive man. He has done this quickly in the presence of thousands of witnesses with the skill of a true artist who knows the limitations of his medium and who is master of his technique."

Some other experimenters have said they can demonstrate how flakes are removed in the shaping of stone tools and weapons, the report continues, but they admit that they cannot explain it to others. The Wisconsin arrow-maker has analyzed the primitive techniques and has explained the types of blows and angles of fracture which the Indians used to produce their arrows, hammers, spear heads, and axes.

An ordinary stone arrow point can be shaped in two to five minutes, by this modern master of stone age craft. Within half an hour he can produce the groove of a stone axe. This is cited by Mr. Pond as good evidence that stone age weapon making proceeded with reasonable speed and efficiency, and was not the long, tedious, and difficult labor which it has sometimes been described.

Mr. Skavlem, who is eighty-four years old, is continuing his experiments with the primitive stone worker's art.

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MODERN STONE AGE TOOL

This axe with groove, wedged seat and finished polish was made by Mr. Skavlem, of Wisconsin, in four and a half hours. Most axes left by Indians are less finished and doubtless required less time. The blocks on the left show how cuts were made with the axe.