

ing farther north along the continental borders, where weather is warmer in winter, and dipping far toward the south in the interior, where weathers are severe.

This is strong indication that our continent has remained in essentially its present position since Eocene time, and that plant populations have done the drifting, moving slowly southward as the climate cooled, and shifting a little

to the north again during warmer inter-ludes.

Other exhibits will illustrate work done recently by Institution scientists on such diverse subjects as the gene, or basic physiological unit of heredity, the interpretation of Maya religion as recorded in the architecture, art and hieroglyphic writings of that once great people, and the phenomena of volcanic activity.

Science News Letter, December 14, 1940

ASTRONOMY

Relation Is Traced Between Meteors and Encke's Comet

If You Saw "Shooting Stars" During October or November, They May Have Been Parts of Stone-Age Wonder

IF, DURING the autumn, you notice a shooting star that seems to emerge from the constellation of Taurus, in the eastern evening sky at present, you are probably seeing the remains of a huge comet that may have been watched with fear and wonder many thousands of years ago by our late Stone Age ancestors.

These meteors are members of the Taurid shower, so called because of the direction from which they come. According to Dr. Fred L. Whipple, Harvard astronomer who reports on his researches in *The Telescope* (Nov.-Dec.), the Taurids seem to be cousins of puzzling Encke's comet. It comes around once every three years and four months, but is never visible to the naked eye.

From observations of Taurid meteors, with special cameras, he finds that their speed around the sun varies from 23.3 to 23.5 miles per second. This shows conclusively that they are part of the solar system, moving about the sun in a closed path. Had they been moving faster than 26.5 miles per second, they would have come in from outer space.

This, indeed, had been suggested in the past, but Dr. Whipple finds the reason for such an erroneous conclusion. The meteors that are seen in early November have longer and narrower orbits than those that come in late October, and this led the earlier astronomers astray.

Dr. Whipple also finds that the paths of the meteors are quite similar to that of the comet, except that the planes of the meteor and comet orbits are at an angle of about 12 degrees. This would seem to preclude the possibility of a connection, but he has worked out a new mathematical theory for the pull of Jupi-

ter on the comet. The plane of the comet's motion, he demonstrates, wobbles over a long period of time. Many thousands of years ago the orbits were nearly the same.

"The most reasonable conclusion to be drawn from this evidence," Dr. Whipple says, "is not that the Taurid meteors arise from Encke's comet but rather that they both have a common ancestor, some large comet that broke up into several smaller ones.

"One of the smaller descendants can still be seen alive as Encke's comet, while only the skeletal remains of others occasionally collide with the earth to produce showers of meteors. It is interesting to know just how long ago the parent comet met with disaster and we may estimate from the present data that the break-up probably occurred some five thousand to fifteen thousand years ago."

First observed in 1786 by a French astronomer named Mechain, Encke's comet has been watched on forty or more visits since then. Its three-and-a-third-year period is the shortest of any periodic comet.

Unlike most comets, the name commemorates not the discoverer, but Johann Franz Encke, a German, who first showed that it was a periodic comet. He also made an exhaustive mathematical study, which revealed that its period was gradually shortening. Between 1819 and 1914 this amounted to about two and a half days. However, after Encke's death in 1865 the rate of decrease was considerably reduced and in recent years the period has hardly changed at all.

Encke's suggestion that the decrease was the result of some cloud of resisting material through which the comet passed has thus been discarded, because, says



WINGS AT THE WINDOW

Judy, a baby rosebreasted grosbeak, being fed by Mrs. Ada Clapham Govan, author of "Wings at My Window," (Reviewed, SNL, this issue)

Dr. Whipple, "a resisting medium dense enough to affect the comet's motion could hardly disappear in a few years."

The reason for this change is an astronomical puzzle. So, indeed, is the fact that the comet still exists. Because it moves in a small orbit, says Dr. Whipple, it "is activated by fairly intense sunlight at all times and brightens up every three and one-third years when it approaches the sun. How it can continue to show indefinitely as a hazy diffuse object and not be completely dissipated is truly a mystery."

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The world's most northern highway is the macadam road in Finland, running 310 miles north from a rail head near the Arctic Circle to an ice-free Arctic Ocean port.

● RADIO

P. L. Ricker, president of the Wild Flower Preservation Society and botanist of the U. S. Department of Agriculture, will discuss "Our Disappearing Christmas Greens," as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, Dec. 19, 3:45 p.m. EST, 2:45 CST, 1:45 MST, 12:45 PST. Listen in on your local station. Listen in each Thursday.