

Kid's KOrner

Halley's: a star among comets

WASHINGTON — A "magnificent old conflagration," Mark Twain thought. When last seen, it was a fiery ball streaking across the night sky like some shooting star. Or so it was popularly believed in 1910.

Comet Halley came back as a dirty snowball that barely moves among the stars from night to night. It is no less a marvel.

"The snowball theory cut down on the hysteria," says Fred L. Whipple, the renowned 79-year-old Harvard astronomer who in the late 1940s first described comets as great masses of icy substances, embedded with cosmic dust or meteoric particles. They are probably the stuff of the origin of the 4.6 billion-year-old solar system.

Malevolent 'Broom Stars'

More has been learned about the nature of comets since Halley's spectacular 1910 appearance than in all the centuries since its first recorded sighting in 240 B.C. by the Chinese, who thought of comets as "broom stars" sweeping the heavens of evil and sending disasters down to Earth.

As much or more is expected to be discovered before Halley's next visit in 2061. Its 1986 passing, although among its dimmest, will be the most-watched astronomical event in history.

As part of the International Halley Watch, 950 scientists in 50 countries, 400 to 500 serious amateur astronomers, and 100 of the world's largest telescopes will be focused on the comet.

"We're even trying to cover the oceans as much as possible by setting up an island network, so we can get a record of observations every 15 degrees around the globe," explains Murray Geller, U.S. deputy director of the Halley

Watch.

For the first time, a flotilla of spacecraft—two Russian, two Japanese, and one European—is speeding toward Halley's. The European Space Agency's Giotto mission is the most daring, targeted to come within 300 miles of the comet's nucleus on March 13 and take the first pictures of it. U.S. spacecraft will be distant observers.

For most earthlings, the celestial show will be less than dazzling, because of the comet and planet's relative positions. In 1910, Earth nearly had a close encounter with Halley's tail. This time, when the comet is brightest in March and April, it will pass beneath the plane of Earth's orbit. On April 11, when it will be closest to Earth, it will be 39 million miles away. The best views will be south of the equator.

In the Northern Hemisphere, Halley's will be most visible in January after sunset and in mid-March before sunrise. (In December it looked like a fuzzy teardrop.) For best viewing, it is necessary to go to a hilltop beyond the range of the millions of city lights that astronomers complain have "polluted" the skies since 1910.

First Orbit Calculated

Of all the 700 to 800 known comets, Halley's was the first whose elliptical orbit around the sun was calculated and whose faithful return, every 75 to 76 years, was noticed and predicted. English astronomer Edmond Halley (rhymes with valley) first recognized the phenomenon in 1705. Proof didn't come until after his death, when a German farmer, an amateur astronomer, spotted the comet on Christmas night 1758, reappearing as Halley had

foretold. Thereafter it has carried Halley's name.

Its fame, brightness, predictability, and long life (it shows no signs of "burning out") have made Halley's a star among comets in attracting scientific attention. Today the primary focus is on the head of the heavenly body and its icy nucleus, an irregularly shaped sphere estimated to be about four miles in diameter.

According to Whipple's theory, now generally accepted, a comet is a conglomerate of frozen substances: water, ammonia, methane, carbon dioxide, and hydrogen cyanide.

When a comet nears the sun, some ice evaporates, and the dust within it is blown off. Halley's already has lost some of its 1910 crust. A haze of dust, called a coma, forms around the nucleus. As a comet gets closer to the sun, its coma grows bigger, sweeping into a tail that may stretch millions of miles, always away from the sun.

A comet actually has two tails, which sometimes appear as one. Halley's tail may extend 50 million miles, but all its matter could fit into a suitcase.

A snowball in sunlight — some of its ice turning directly to gases — is really like a small jet engine, Whipple realized. When it leaves the sun, its tail shrinks, and it becomes a frozen ball once again.

Where do comets come from? They are thought to originate in the "Oort Cloud," a huge spherical shell that surrounds the sun at the outer reaches of the solar system. Named for the Dutch astronomer who first envisioned this comet nursery in 1950, the vast cloud is estimated to contain at least 100 billion orbiting comets.

Six Discoveries Annually

Comets remain there undisturbed unless the gravity of a passing star pulls them out toward the sun, making them visible from Earth. About a half dozen new comets are discovered each year, says astronomer Brian G. Marsden, director of the Central Bureau of Astronomical Telegrams of the International Astronomical Union.

"There may be a thousand times as many comets in an intermediate part of the solar system as there are in the Oort Cloud — perhaps a quadrillion," Marsden says. "It's impossible to know how many are out there. We have no way to detect them."

Comets are believed to be leftovers of the materials from which the sun and planets were formed. "Comets have spent most of that time in the deep freeze of outer space. They are the best way to find out about the origin of the solar system. We are placing our hopes on comets," says astronomer Jay M. Pasachoff of Williams College.

One of the most intriguing unanswered questions, Whipple says, is "the possibility that comets brought life-giving elements to the surface of the Earth...that some of the atoms in our bodies may have come from comets...that we ourselves are made of comets."

The Space Age has carried scientists closer than ever to a true understanding of comets. Ultraviolet-light detectors have shown that most of the icy nucleus is frozen water and that an invisible hydrogen cloud surrounds it. Radar has proved that the core is a solid snowball. Radio-tracking has revealed new molecules.

A spacecraft caught up with a comet for the first time last September, when the U.S. International Cometary Explorer flew through the tail of Comet Giacobini-Zinner.

The five spacecraft en route to March flybys of Halley's should send back clues about the size and appearance of its nucleus, the atomic composition of the chemical factory of gases close to the nucleus, and the amount of cosmic dust.

Possible Permanent Contact

Man may never again lose contact with Halley's. Cameras on the space telescope, to be launched in early 1987, possess the technology to "follow Halley's all the way out to its farthest point beyond Neptune," says John C. Brandt of the National Aeronautics and Space Administration. But, he cautions, "the cameras may not live up to expectations and may not be used for Halley's."

After Halley's—what? The next major breakthrough, Whipple says, would be snatching a piece of a comet and bringing it back to Earth. "If we could analyze the isotopes, we could answer a lot of questions about time, place of origin, and life-giving elements," he says. A second Giotto satellite may undertake such a mission.

NASA had plans, dropped from the 1986 budget, to rendezvous with a comet in the 1990s and fly along with it. There's even some talk of ultimately putting a man on a comet, possibly before Halley's return in 2061.



GIGANTIC SELECTION
In Lancaster Farming's CLASSIFIEDS

COLOR THIS!

- | | |
|-----------|---------------|
| 1. BLACK | 6. PEACH |
| 2. RED | 7. GREEN |
| 3. YELLOW | 8. LT. BROWN |
| 4. BLUE | 9. LT. BLUE |
| 5. BROWN | 10. LT. GREEN |

GALILEO MADE THE FIRST PRACTICAL USE OF THE TELESCOPE TO DISCOVER MANY NEW FACTS ABOUT ASTRONOMY. HE WAS CALLED THE "FATHER OF SCIENCE." BEGINNING IN 1609, HE BUILT MANY TELESCOPES AND SOLD THEM THROUGHOUT EUROPE. HE ALSO MADE MORE POWERFUL TELESCOPES THAN EVER BEFORE.

