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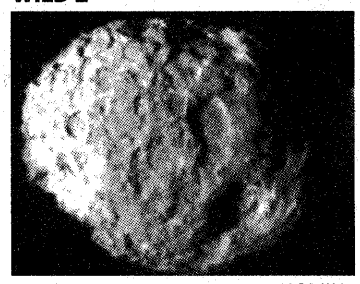
Not all comets are alike

Scientists studying the highest-resolution images ever taken of a comet have discovered that the Wild 2 comet differs markedly from other observed comets.

WILD 2



NASA/JPL

NASA's Stardust spacecraft passed within 147 miles on Jan. 2. Pictures show deep impressions, some with vertical pinnacles up to 100 meters high. About 20 jets spewed dust and gas.

BORRELLY

NASA/JPL

Deep Space 1 flew within 1,400 miles on Sept. 22, 2001. Potato-shaped and 5 miles long, Borrelly is smooth with a charcoal-like coating and a few, not-very-prominent dust jets.

HALLEY

ESA

The European Space Agency's (ESA) Giotto passed within 370 miles in March 1986. Bright jets of dust were seen on the sunlit side of the 9-mile-long comet.

Most of a comet's orbit is spent beyond Pluto. In 1974, Jupiter's gravitational field kicked Wild 2 into the inner solar system, where it now orbits between Jupiter and Mars.

Sources: Donald Brownlee, professor of Astronomy, University of Washington, NASA Jet Propulsion Lab

Chicago Tribune

Comet dust seen as key to life

Probe will carry samples to Earth

By Andreas von Bubnoff
Tribune staff reporter

Organic chemicals found on a comet may support the idea that ancient cosmic collisions helped spur the origins of life on Earth, scientists said Thursday as they presented data from a probe that passed within 147 miles of comet Wild 2 earlier this year.

The probe, called Stardust, is bringing back to Earth the first dust samples ever returned from a comet. But data and pictures published Friday also give detailed clues about the comet's anatomy that indicate it is surprisingly different from comets studied before.

Comets offer unique insights into the formation of the solar system because they contain material that has changed little since the sun and planets formed more than 4 billion years ago. They are essentially dirty snowballs, composed mostly of frozen water and dust, and they are visible only when their orbits take them near the sun. The sun's heat causes jets of dust and water vapor to burst from the comet's surface—forming the comet's tail.

Because the young Earth was too hot for many organic molecules to last for long, some experts have proposed that impacts by comets in a later period may have seeded the planet with some of life's chemical building blocks.

"We don't expect that life came from comets," said Donald Brownlee, the leading scientist of the Stardust mission. "But we do expect that the molecules used by life probably came from comets and asteroids."

That theory gained support from Stardust data analyzed by a German team led by Jochen Kissel. Their findings appear in Friday's edition of the journal Science along with three other papers on the comet probe, including one by University of Chicago scientists.

Kissel's group used instruments on the probe to analyze dust near Wild 2 and found an organic compound called PQQ that had never been detected in a comet. Researchers believe PQQ plays a key role in cell growth.

"PQQ is found in [almost] every cell of every living entity on earth," Kissel said.

In addition to its chemical findings, Stardust obtained the highest resolution photos ever taken of the solid part of a comet, called the core. The comet was riddled with craters, which scientists said indicates that Wild 2's original surface has not been burned away by the sun.

Named after the Swiss scientist who discovered it, Wild 2 (pronounced "vilt two") entered the inner realm of the solar system only recently, in 1974, after a close encounter with Jupiter changed its orbit. Only then did the comet's ancient core start losing material to the heat of the sun.

"We were expecting craters," Brownlee said. "Craters mean that some of [Wild 2's] surface is really old."

Yet the craters and structures were unlike anything seen before on the surface of comets, the researchers said.

"We were totally stunned by what we saw," Brownlee said, describing craters with almost vertical walls. "The vertical walls are amazing because if the comet were made of a powdery material, you couldn't support vertical surfaces."

Many scientists had thought of comet cores as fragile, said Claudia Alexander, project scientist at NASA's Jet Propulsion Laboratory in California. Other comets seemed so tenuous that they fell apart easily, as when comet Shoemaker-Levy 9 broke up as it approached Jupiter in 1994. But Wild 2's craters suggest its composition is more solid.

Scientists were also surprised to see that the comet had about 20 jets coming from its surface.

"We thought that there would be maybe one jet," said Benton Clark, chief scientist of space exploration systems at Lockheed Martin.