

## Surprises in comet dust

by World Science

Dust gathered from a comet and brought to Earth tells a tale of a solar system that partially turned itself inside out, researchers say.

Dust trailing a distant comet, and gathered by a NASA spacecraft, has yielded a surprisingly varied mixture of materials, astrochemists say. Since comets are thought to contain material left over from the early Solar System, this variety suggests something was mixing up the contents of the system in its youth, the researchers add. What caused that, they don't know.

A researcher holds a cube of aerogel, a light-as-air foam used to slow down and capture dust particles from the Wild 2 comet. (© Science) "I think of it as the solar system partially turning itself inside out," said Donald Brownlee of the University of Washington, lead author of one of seven papers describing the findings in the Dec. 15 issue of the research journal Science. One theorized possibility is that the newborn sun blasted jets of matter from its poles, said John Bradley of the Lawrence Livermore National Laboratory in Livermore, Calif. This material might then have rained far out onto the emerging planetary and cometary system, circling the stars' equator. "It appears to have been a much more dynamic and perhaps even violent environment than expected," added Bradley, head of the Livermore team involved with the comet dust mission. Certain characteristics distinguish particles that come from near the Sun from those that inhabit distant space, astrochemists said. The distant particles tend to be glassy, while those close to stars are more crystalline, meaning the atoms are arranged in a more orderly way. This second type was abundant in the analyzed comet dust, researchers said. That, they added, suggests that as the Solar System formed 4.6 billion years ago, material moved from the scorching inner zone to its icy outer reaches. The mixing would have made itself felt as far as the Kuiper belt, a region of icy bodies orbiting the Sun past Neptune, and from which the comet, called Wild 2, comes. Scientists believe comets contain primordial material left over from the Solar System's birth. This is because comets circulate mostly in distant, cold reaches

of the system, where they stay relatively undisturbed. Wild 2 is thought to have inhabited the outer solar system until 1974, when a close encounter with Jupiter shifted its orbit closer to Earth. NASA's Stardust spacecraft left Earth in early 1999, met the comet beyond Mars orbit five years later and returned last January with thousands of dust particles.

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