

Offered Title: To Touch a Comet

Once thought to be harbingers of doom, comets have been objects of great interest from the moment of their discovery.

We know now that comets are natural solar system objects, not the omens of grief and pain conjured up in our ancestors' minds. There have been numerous missions to comets and a few even managed to collect comet stuff. Let's look at what those missions found out about scary "hairy stars".

Stardust was the first to touch/catch cometary material. NASA launched it on February 7, 1999 heading toward comet Wild 2. Its secondary mission was to collect cosmic dust for analysis. On its way to Wild 2 it snapped a blurry but useful photo of asteroid 5535 Annefrank. It deployed a collector before, and then upon reaching Wild 2 and entering its coma (a surrounding fog of evaporated cometary material caused by solar energy as comets get closer to the Sun). A material called aerogel was used to capture cosmic dust and this comet's stuff. Aerogel is an inert, very light substance that can slow and stop rapidly moving particles without affecting their makeup. Stardust was so successful its mission was extended after the sample return capsule made it back to Earth intact. That happened on January 15, 2006.

What did Stardust catch? Of the estimated million particles captured, 45 were identified as cosmic dust, mostly iron-silicate-carbonate, like asteroids. The remaining catch consisted of organic molecules such as aliphatic hydrocarbons, and gases methylamine and ethylamine. The presence of water was seen indirectly with the recovery of copper sulfide which forms with exposure to water. The amino acid glycine was also detected in some of the cometary coma stuff. We know glycine is one of the building blocks of living things.

ESA's Rosetta launched on March 2, 2004 and attained orbit around comet 67P/Churyumov-Gerasimenko (67P) on August 6, 2014. It had a lander called Philae which was scheduled to settle down on 67P on November 12, 2014, then collect and analyze samples. Unfortunately, Philae's landing apparatus malfunctioned. Philae bounced into a deep crack and landed on its side. Using Rosetta, engineers were able to find and photograph it. Amazingly, it was still able to examine 67P a bit before its batteries died. What did it find out? As with Stardust/Wild 2, 67P has some organic compounds. 67P is crunchy on the outside and has layers and voids on the inside. Perhaps most interesting, 67P has molecular oxygen surrounding it.

Deep Impact, a NASA probe launched on January 12, 2005 shot an impactor into comet Temple 1 on July 5, 2005. Bam! The resulting debris cloud was composed of carbonates, sodium, silicates, clays, and a little ice. Less ice than expected, a surprise.

As with most things, not all comets are the same.

What's in the Sky?

January 13; night; south: A First Quarter Moon and Mars share the sky

Coming on January 20-21: Total Lunar Eclipse! – stay tuned.