

## Comets - Their Silent Testimony By Joe Spears

For ages, man has viewed comets with awe, even with fear. Comets are one of the most amazing phenomena to be seen in the sky. Often, comets have induced fear of possible portending doom.<sup>1</sup> Yet, comets are also arguably one of the most wonderful, majestic and beautiful spectacles ever seen in the sky, as you can see in Figures 1,2, and 3.

The Babylonian "Epic of Gilgamesh," thousands of years old, associated destruction with the arrival of a comet. Comets have been blamed for the Great Flood. This negative view of comets existed in Rome, Mongolia, and other places. Romans associated a comet with the assassination of Julius Caesar. Incas cited a comet to their conquest by Pizarro.<sup>1</sup>

A comet has certain parts which have been described as a head, a coma, a nucleus, jets, and a tail. The tail is the long, large part of a comet, which can be millions of miles long. It is somewhat reminiscent of illustrations you may have seen of the trail of exhaust left by a rocket. In this comparison, the rocket itself would be the head. Inside the head is the nucleus, which may be only a few miles in diameter. Surrounding the nucleus is a much larger spherical region which can be as large as the sun itself! This is called the coma.

The nucleus sometimes emits streams of material. This can be seen in Figure 4, actual photographs of a comet nucleus taken by a space probe. Note the jets or streams (bright colored) directed away from the comet nucleus, which appear in the image to look like beams or rays of light. Comets supposedly originated from cosmic dust, as did the solar system. Around 1950, astronomer Fred Whipple developed the "dirty snowball" hypothesis. Comets were an accumulation of water, gases, and the dust that formed the early solar system. But there was a problem—comets loose material as they pass around the sun at such a rate that they could not have lasted long enough to have originated when the early solar system was surmised to have originated, billions of years ago.

Figure 1



Comet Hyatuke

Figure 2



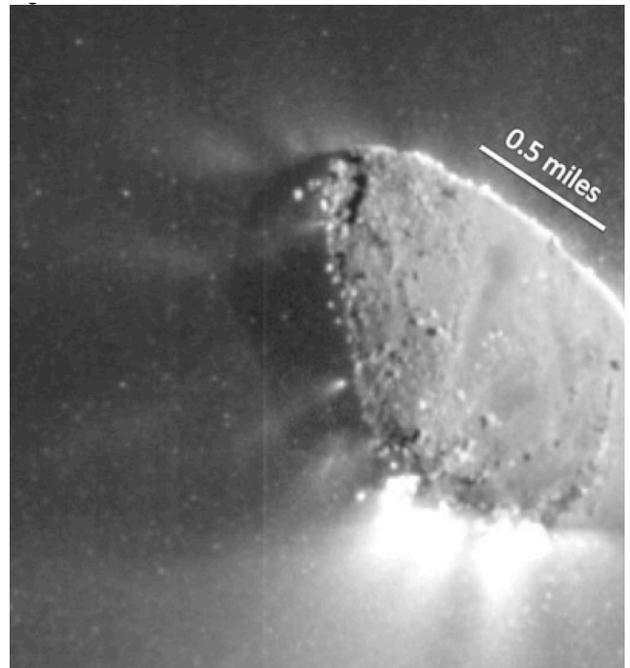
Comet Hale-Bopp by Philipp Salzgeber

<sup>1</sup> The National Aeronautics and Space Administration, Deep Impact, Mission to a Comet <[http://www.nasa.gov/mission\\_pages/deepimpact/media/f\\_ancient.html](http://www.nasa.gov/mission_pages/deepimpact/media/f_ancient.html)> Accessed 2014 Feb 04

Some comets are dissipating at such a rate that they could only be thousands of years old, not even one tenth



Comet Hale-Bopp



Jets on Comet Hartley

of 1 percent as old as the conventional idea of the age of the solar system. Conventional theory may make some comets older than this, but there still exist those that by the conventional theory could only be thousands, not millions, of years old. So, how can these comets be millions of years old or older? How can they be as old as the solar system? The answer is simple; they can't.

How does science explain the origin of comets? Where did they come from? How did they originate?

This is where the Oort Cloud comes in. The Oort Cloud, named for Dutch astronomer Jan Oort, is a hypothesized collection of "ice-balls" formed from interstellar dust, reaching as far out as 1,000 times the distance of Pluto from the sun. So, for a comet that is by conventional theory only 10,000 years old, something had to have happened about 10,000 years ago to explain the origin of the comet. The Oort Cloud explains this comet's origin by postulating that 10,000 years ago,<sup>2</sup> somehow one of those primordial ice-balls got "knocked loose" and fell in toward the sun, starting a long elliptical orbit, which can be observed today as the orbital path of the comet.

So according to the Oort Cloud view, there are comets out there, or precomets or protocometes, that may get knocked loose at times and fall in toward the sun, thus forming what we today call a comet.

There have been recent space missions to investigate comets. One of them, Deep Impact, equipped with a

camera, crashed into a comet nucleus, while the camera filmed the crash.<sup>3</sup> Another mission, the Stardust Mission, collected material from the comet and brought it back to earth for laboratory analysis.<sup>4,5</sup> And of course, several missions, including the ones mentioned above, brought back stunning, spectacular close-up photographs of comets.

Below are quotes from various sources concerning the mysteries revealed in recent missions to the comets. University of Arizona associate professor of cosmochem-

<sup>3</sup> Deep Impact <<http://deepimpact.umd.edu/>> Accessed 2014 Feb 01

<sup>4</sup> Stardust (Spacecraft) <[https://en.wikipedia.org/wiki/Stardust\\_\(spacecraft\)](https://en.wikipedia.org/wiki/Stardust_(spacecraft))> Accessed 2014 Feb 05

<sup>5</sup> Brownlee D (2009 Oct 29) Stardust: A mission with many scientific surprises, Stardust, NASA's Comet Sample Return Mission <<http://stardust.jpl.nasa.gov/news/news116.html>> Accessed 2014 Feb 04

<sup>2</sup> The age is assumed for this specific example.

istry and planet formation at the university's Lunar and Planetary Laboratory, Dr. Daunte Laurretta, the principal investigator of the UA team involved in analysis of samples returned by NASA's Stardust mission, had this to say:

... iron and copper sulfide minerals we observed in our study. The sulfide minerals formed between 50 and 200 degrees Celsius (122 and 392 degrees Fahrenheit), much warmer than the sub-zero temperatures predicted for the interior of a comet.<sup>6</sup>

UA graduate student Eve Berger said:

The mineral we found, cubanite, is very rare in sample collections from space. It comes in two forms: the one we found only exists below 210 degrees Celsius (410 degrees Fahrenheit). This is exciting because it tells us those grains have not seen temperatures higher than that.<sup>6</sup>

Cubanite is a copper iron sulfide, which is also found in ore deposits on Earth exposed to heated groundwater and in a particular type of meteorite.<sup>6</sup> Berger added, "Wherever the cubanite formed, it stayed cool. If this mineral formed on the comet, it has implications for heat sources on comets in general."<sup>6</sup>

The discovery shatters the existing paradigm of comets as "dirty snowballs," whose icy bulk never gets warm enough to melt. Cecile LeBlanc<sup>7</sup>

When these minerals formed they were either red hot or white hot grains, and yet they were collected in a comet, the Siberia of the Solar system. Donald Brownlee, Principal Investigator, Stardust Mission<sup>8</sup>

That's a big surprise. People thought comets would just be cold stuff that formed out ... where things are very cold. It was kind of a shock to not just find one but several of these, which implies they are pretty

common in the comet. Michael Zolensky, NASA curator<sup>9</sup>

...most of the components from the comet have isotopic compositions similar to Earth and are of solar system origin. Donald Brownlee, Principal Investigator, Stardust Mission<sup>10</sup>

Scientists at University of Arizona have learned that Comet Wild-2 has minerals on its surface requiring liquid water for their formation...<sup>7</sup>

...on Comet Wild-2, the Arizona scientists did find iron and copper sulfide minerals that must have formed in the presence of water.<sup>7</sup>

Comet Wild-2 had been in the outer reaches of the solar system, a Kuiper belt comet, until an encounter with the giant planet Jupiter in 1974 bumped it into an inner solar system orbit.<sup>11</sup>

Note that the cubanite mentioned above can only form in the presence of water (at less than 210 degrees C).<sup>12,13</sup>

Though the alleged Oort Cloud is out beyond Pluto, where it is very cold, comets were found to contain minerals that require high temperatures to form. The materials were in dust samples captured when the robotic Stardust spacecraft flew past the comet Wild 2 in 2004. A 100-pound capsule tied to a parachute returned the samples to Earth in January. The samples include minerals such as anorthite, which is made up of calcium, sodium, aluminum; silicate; and diopside, made of calcium magnesium and silicate. Such minerals only form in very high temperatures.<sup>8,9</sup>

Not only did these scientists find evidence for liquid water, but they also were able to establish an upper

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<sup>9</sup> Associated Press (2006 Mar 13) Comet dust samples offer puzzling mystery <<http://www.nbcnews.com/id/11813637>> Accessed 2014 Feb 06

<sup>10</sup> Brownlee D (2007 Jul 06) Stardust's Big Surprise <<http://stardust.jpl.nasa.gov/news/news113.html>> Accessed 2014 Feb 06

<sup>11</sup> Stolte D (2011 Apr 05) Frozen comet had a watery past, UA scientists find <<http://uanews.org/story/frozen-comet-had-watery-past-ua-scientists-find>>. Accessed 2014 Feb 06

<sup>12</sup> Sheldon RB, Hoover RB (2011 Sep 23) More evidence for liquid water on comets, Proc. SPIE 8152, Instruments, Methods, and Missions for Astrobiology XIV, 81520D Available at: <<http://www.rbsp.info/rbs/RbS/PDF/spie11h2o.pdf>> [22]> Accessed 2014 Feb 06

<sup>13</sup> Berger EL, Zega TJ, Keller LP, Laurretta DS (2011) Evidence for aqueous activity on comet 81p/wild 2 from sulfide mineral assemblages in stardust samples and chondrites, *Geochimica et Cosmochimica Acta* 75:3501-3513

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<sup>6</sup> Stolte D (2011 Apr 05) Frozen comet had a watery past, UA scientists find <<http://uanews.org/story/frozen-comet-had-watery-past-ua-scientists-find>> [16]> Accessed 2014 Feb 05

<sup>7</sup> LeBlanc C (2011 Apr 07) Evidence for liquid water on the surface of Comet Wild-2, EarthSky <<http://earthsky.org/space/evidence-for-liquid-water-on-the-surface-of-comet-wild-2>> Accessed 2014 Feb 06

<sup>8</sup> Malik T (2006 Mar 13) NASA's Stardust comet samples contain minerals born in fire <<http://www.space.com/2150-nasa-stardust-comet-samples-minerals-born-fire.html>> Accessed 2014 Feb 06

temperature limit for the comet. They found a mineral that only exists below a certain temperature.

NASA scientists have a new mystery to solve: How did materials formed by fire end up on the outermost reaches of the solar system, where temperatures are the coldest?<sup>7</sup>

Also, reported in 2009 from *Smithsonian Magazine*:

Stardust scientists were surprised to find that some of the comet's grains are made of minerals that form only at extremely high temperatures. ...

No one had expected that the hot ingredients of the inner solar system mixed with the cold outer solar system billions of years ago. "It's a remarkable result," says planetary scientist Michael A'Hearn of the University of Maryland. "It's causing us to rethink how things got put together."<sup>14</sup>

And from Space.com:

Researchers studying samples of Comet Wild 2 (pronounced "Vilt 2") embedded in Stardust's gel-filled collector found that the minerals formed under extremely high temperatures—such as those near a star—and not in the frigid cold expected at the Solar System's edge, where most short-term comets originate.

### **Problems with Conventional Theories**

"It's a mystery to me how comets work at all." - Donald Brownlee, Principal Investigator, The Stardust Mission<sup>14</sup>

Let's review the findings we've looked at so far.

We found in comets minerals that require temperatures below 210 degrees Celsius, and other minerals that require temperatures above 210 degrees Celsius.

We found in comets minerals that require liquid water to form, yet liquid water cannot exist in the cold regions of space where comets supposedly formed.

"Current thinking suggests that it is impossible to form liquid water inside of a comet," said Dante Lauretta, an associate professor of cosmochemistry and planet formation at the UA's Lunar and Planetary Laboratory. Lauretta is the principal investigator of the UA team involved in analysis of samples returned by NASA's Stardust mission.<sup>6</sup>

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<sup>14</sup> Clark S (2005 Sep 09) Comet tails of the unexpected, *New Scientist*, 2516. <<http://www.newscientist.com/article/mg18725161.300-comet-tails-of-the-unexpected.html>> Requires subscription. Accessed 2014 Feb 8.

How is this possible? Not by means of the conventional theoretical mechanisms.

One problem is the presence of craters and other detailed formations found on comets (Figure 5). Craters should decrease in number due to erosion faster than they form from impacts. Remember, the moon and other cratered objects supposedly have had billions of years to accumulate their craters. Many comets have had only thousands of years to accumulate craters, according to conventional theory. Why then today are we finding craters on comet nuclei? Of course, some have come up with alternative theories and explanations for these craters and other new observations, such as the unexpected mineral composition of comets. We will not go into those theories for this article. However, the point remains: the previous theory of comets' formation billions of years ago does not work. Also the Oort Cloud hypothesis does not work because of the minerals found in comets that require much higher temperatures than those of the Oort cloud and because of minerals that require liquid water to form while there cannot be liquid water in the Oort cloud. And both the earlier theory and the Oort hypothesis assume the origin of the solar system billions of years ago from interstellar dust.

Figure 5



Cratered comet

### **Implications**

Science today obviously does not completely understand comets. As noted previously, the principal investigator for the Stardust Mission said, "It's a mystery to me how comets work at all."<sup>14</sup> We do hope to learn more about comets, the sun, and the rest of the solar system. As we go about this discovery process, we notice there are things for which we have no explanation and for which previous explanations now have become inadequate.

As Dr. Brownlee's quote above suggests, there is much we—science—do not yet understand about origins: origins of the earth, of comets, of the solar system, of the universe, and of life itself. Yes, this goes beyond comets, but look at other articles published by TASC and other sites, as well as other books and journals, and you will see that there is much evidence that, in many fields, science has not disproven a creator. If this information on comets leads to a search for truth about other fields and theories, then that search can lead to discovery. Lack of humility and lack of willingness to learn are the enemies of true science. Remember that when Galileo invited others to look through his telescope and see for themselves the mountains of the moon or the moons of Jupiter, the response to Galileo's invitation was a refusal to even look. Why? Because they already knew!

Einstein advocated a continuing search of discovery and questioning of scientific hypotheses. Would we have even heard of Einstein today had he not been willing to question the veracity and validity of Newton's laws? Science is not a popularity contest; for every advance of scientific knowledge, every discovery, at one time, when first discovered, by definition was previously unknown and therefore not accepted by science and was not the majority belief in science. In fact, it could not have been the majority belief.

To proposition that science has all the answers for origins, and that those answers disprove the involvement of God or a creator, seems somewhat premature and not validated as a hypothesis. Why not perform research to find out what is the true case on these topics? In the words of one great teacher: ask, seek, and knock. (Matthew 7:7)

The argument that science has shown there is no creator seems less and less valid a claim as we learn more of what actually is true and investigate more evidence.

The heavens declare the glory of God, and the sky above proclaims his handiwork. (Psalms 19:1)

## COMING EVENTS

**Thursday, March 13, 7:00 pm, Providence Baptist Church, 6339 Glenwood Ave., Raleigh, Room 631**  
Phil Johnson will speak about Dietrich Bonhoeffer, the man and his theology of ethics.