Cover Letter for Daily Telegraph Young Science Writer of the Year 2002


| | |
|---|---|
| Name: | Paul Withers |
| Date of Birth: | 03 October 1975 |
| Contact Address: | 39 Greenhill Lane, Wheaton Aston, Stafford, ST19 9PL |
| Phone Number: | 01785 840720 |
| Email: | withers@lpl.arizona.edu |
| Award Category: | 20 – 28 years old |

Paul Withers

# Medieval Impacts on the Moon?

Around the time I was born, planetary scientist Jack Hartung first read the medieval chronicle of Gervase of Canterbury, a monk of the Cathedral. He found in it a dramatic passage from June 1178 AD. It described a flaming torch springing out of the crescent Moon one evening and spewing fire, hot coals, and sparks. Gervase had no idea what could cause such a sight. Hartung suggested that the men of Canterbury witnessed a large asteroid hitting the Moon, gouging out a crater and throwing glowing, molten rock high above the lunar surface to be seen as a flaming torch of fire, hot coals, and sparks. Using crisp pictures of the Moon's surface, just returned by the Apollo astronauts, he found a very young crater near the site of the flaming torch. This crater, called Giordano Bruno, is 22 km across and shows no signs of being eroded, softened, or otherwise degraded by time. With the slow pace of geology on the dry, cold Moon, it could have been formed 10 years ago or as long as 10 million years ago. Whatever its age, it is the youngest large crater on the Moon. To explain the words of Gervase, Hartung concluded that the formation of this lunar crater was witnessed from Canterbury 824 years ago.

Was the Moon really hit by a mile-wide hunk of rock so recently, a hunk of rock so large that it would have threatened the continued existence of human civilization if it had hit the nearby Earth instead?

I first heard of this story a couple of years ago. My older and wiser colleagues told me that the story might be true, but were not able to find a way to prove or disprove it. Intrigued, I spent many hours in the library delving deeper into the story. I began to think about the flaming torch and what would have happened to the blobs of ejected molten rock, described by Gervase as fire, hot coals, and sparks, as they flew above the Moon. Pulled back by gravity, the slowest would have returned to the Moon, forming small craters of their own. Some, the fastest, would have escaped the Moon and Earth and begun travelling around the solar system. Some would have been able to escape the Moon but would have flown straight into the Earth, burning up as meteors as they entered the Earth's atmosphere. About a week would have separated the first, fastest, arrivals from the last and slowest. Excavating a 22 km diameter crater generates a huge amount of rock. The tiny portion of the ejected material that is moving quickly enough to escape the Moon's gravity and in the right direction to hit the Earth weighs an astonishing 10 million tonnes. Studies of other impact craters and their closest man-made analogues, craters from nuclear explosion, have shown that this mass of material must be in cm-sized molten blobs. Splitting the 10 million tonnes into cm-sized pieces gives 1 million, million bright meteors hitting the Earth in the week after the formation of Giordano Bruno. Someone watching the sky that week would have seen tens of thousands of meteors every hour.

The formation of Giordano Bruno on the Moon must have been followed by this dramatic world-wide meteor storm on the Earth. In medieval times, many scholars around the world watched the skies for comets, meteors, eclipses, and other portents of doom. I examined medieval records from Europe, Arabia, China, and Japan for any hints of a

meteor storm in June 1178. I found none. Not even Gervase of Canterbury recorded a meteor storm. Without the associated meteor storm, Hartung's idea must be wrong.

If Giordano Bruno is not 824 years old, then what was described by Gervase of Canterbury? I think the most likely alternative is a meteor in the Earth's atmosphere that was falling straight towards Canterbury. If this meteor appeared close to the Moon in the sky and huffed and puffed dramatically as it vaporized, then witnesses on the ground might have thought that what they saw high in the atmosphere was coming from the Moon.

And Giordano Bruno? He was a monk and a scholar, burnt at the stake in Rome for heresy in 1600. He was burnt for believing that we live in a boundless universe full of worlds like our own, in contrast to the orthodox view of the Moon, Sun, and stars being celestial and unreachable from Earth. His is an apt name to be linked with a puzzle in planetary exploration.

Pictures:
1 – The illustrated manuscript of Gervase of Canterbury, archived in Trinity College, Cambridge. http://www.lpl.arizona.edu/~withers/media/bruno/japan4.jpg
2 – An Apollo picture of the crater Giordano Bruno.
http://www.lpl.arizona.edu/~withers/pppp/original/mapsbruno2001fig1.jpg

Bibliography:
Meteor storm evidence against the recent formation of lunar crater Giordano Bruno (2001) Paul Withers, Meteoritics and Planetary Science, v36, pp525 – 529
http://www.lpl.arizona.edu/~withers/pppp/pdf/mapsbruno2001.pdf