"… After sunset when the Moon had first become visible a marvellous phenomenon was witnessed by some five or more men who were sitting there facing the Moon. Now there was a bright New Moon, …, and suddenly the upper horn [portion of the crescent] split in two. … A flaming torch sprang out, spewing out, over a considerable distance, fire, hot coals, and sparks. Meanwhile the body of the Moon which was below writhed, as it were, in anxiety … the Moon throbbed like a wounded snake. Afterwards it resumed its proper state. This phenomenon was repeated a dozen times or more, the flame assuming various twisting shapes at random and then returning to normal. Then after these transformations the Moon from horn to horn , that is along its whole length, took on a blackish appearance. The present writer was given this report by men who saw it with their own eyes, and are prepared to take their honour on an oath that they have made no addition or falsification in the above narrative."

Thus wrote Gervase of Canterbury, in his medieval chronicle, about a night in June, 1178 AD. Is this an eyewitness account of dramatic activity on the Moon, the after-effects of too much mead, or something else entirely?

In 1976, Jack Hartung offered an explanation for this enigmatic passage. He suggested that it was a description of an impact onto the surface of the Moon. Could he identify the associated crater? Searching for young, large lunar craters, he noted that Giordano Bruno, 22 km in diameter and located in northern mid-latitudes just over the Moon's eastern limb, is close to the "upper horn" of the crescent Moon where Gervase's impact occurred. Could it have formed a mere 800 years previously?

Based on its uneroded morphology and dramatic pattern of bright rays, Giordano Bruno is the youngest crater of its size or larger on the Moon. However, on a lunar timescale, ages are reckoned in millions of years and theoretical cratering rates predict the formation of a Giordano Bruno-sized, or larger, crater every 15 million years or so. The formation of Giordano Bruno in historical times is an unlikely, almost implausible, event, yet not impossible. A Soviet lunar sample return spacecraft, Luna 24, narrowly missed bringing a piece of Giordano Bruno ejecta back to Earth, so we have no radiometric age for its formation.

As you might expect, the notion of a recent large lunar impact caught public attention. It was discussed in the New York Times, Nature, and Carl Sagan's Cosmos series. Several years later, in 1978, the front cover of Science featured research using lunar laser ranging data that showed that the Moon was librating, or shaking around, more than expected and was doing so in a manner consistent with a knock from the formation of Giordano Bruno in 1178. Could this unlikely, exciting idea be correct?

If Giordano Bruno was seen to form in 1178, then the Earth and medieval civilization narrowly escaped disaster at that time. On a cosmic scale, impacts on the Moon are too close to hitting Earth for comfort. Such an impact on the Earth would be a threat to human civilization itself. Not only would towns and villages near the impact be destroyed in seconds, but the Earth's climate would be altered for years to decades afterwards with catastrophic effects on agriculture. Would farmers be able to feed their families if all their

crops had failed? Would the builders of medieval Europe's great cathedrals be able to continue their work? Would the inevitable damage to commercial trade halt developments in sailing and navigation that would eventually lead to the voyages of Columbus? We simply don't know.

From a scientific standpoint, future studies of an effectively pristine lunar crater of such immense size would aid our still tentative understanding of this important geologic process, estimates of cratering rates in the inner solar system would need to be re-examined, and planetary scientists would have an unparalleled tool for public outreach.

Such a provocative idea did not go unchallenged. Nininger and Huss stated that the words of Gervase could not be a description of a lunar impact. How could a reasonably homogenous cloud of ejecta be separated into “fire” and “hot coals” using only an eyeball? How can a phenomenon that is “repeated a dozen times or more” be the single impact that formed Giordano Bruno? They interpreted the text as an eyewitness account of a meteor within the Earth’s atmosphere that, from the perspective of this group of men, appeared directly in between them and the Moon. Yoder, in an analysis of a more complete lunar laser ranging dataset, stated that the large lunar librations did not support the recent formation of Giordano Bruno but were instead the result of internal processes such as turbulent core-mantle friction.

However, exciting ideas like Hartung’s are difficult to disprove completely and for the past two decades it has been lurking in the minds of planetary scientists as “intriguing but improbable” with no obvious way to test it using current datasets. A recent publication in the journal Meteoritics and Planetary Science has offered a new test by considering the fate of ejecta from the formation of Giordano Bruno as it escapes the Moon and reaches the Earth.

Previous calculations by Gault and Schultz showed that 10 million tonnes of ejecta would reach the Earth in the week following the formation of Giordano Bruno. I calculated what kind of meteor storm this would cause on the Earth. With the main uncertainty being in the size of the ejecta as it reaches Earth, I found that medieval skywatchers could have seen fifty thousand meteors per hour each night that week. This is a dramatic, almost apocalyptic, event that surely would have been recorded in every chronicle of the time. If the characteristic ejecta size increases, then the brightness of individual meteors increases and their frequency decreases. Conversely, if the characteristic ejecta size decreases, then the brightness of individual meteors decreases and their frequency increases. Elegantly, observers see either a large number of bright meteors or a very large number of dim meteors – either way, the result is dramatic. Alas, examination of the chronicles does not reveal any records of great meteor storms at that time, so the formation of Giordano Bruno could not have been recorded by Gervase.

Was it simply too much mead? Possibly. Nininger and Huss’s suggestion that an unusually dramatic fireball in the Earth’s atmosphere could be the source of Gervase’s passage is almost untestable, though much more plausible than Hartung’s hypothesis. The

most likely outcome is that we shall never really know what Gervase has recorded for us to puzzle over.