Mt. Vesuvius May Have Turned Ancient Roman Brains Into Glass

By Kristina Killgrove

The archaeological sites of Pompeii, Herculaneum, and Oplontis are well known as a kind of Roman time capsule, resulting from the pyroclastic events of the eruption of Mt. Vesuvius in 79 AD. While researchers have found everything from carbonized bread to human skeletons to two-story buildings preserved for nearly two millennia, a newly published article claims to have analyzed the first evidence of preserved brain matter.

Writing today in the New England Journal of Medicine, Pier Paolo Petrone of the University of Naples Federico II and colleagues detail masses of glassy black material discovered on one human skeleton that was found in the College of the Augustales in Herculaneum. Interpretations of the skeleton, which was found in the 1960s and is not on public display, suggest the person may have been the building's caretaker, unable to flee when Mt. Vesuvius erupted, and eventually perishing in bed.

While thoroughly analyzing this person's remains, Petrone noticed dark-colored, glassy material on the inner surface of the skull. Based on a previous study in which he suggested that red and black residue on Herculaneum bones may have been from iron and blood products, Petrone hypothesized that the changes to the skull may be related to heat-induced "vitrification" of the brain. "The term 'vitrified'," the authors explain, "is applied to substances that have been converted to a glass-like appearance because of exposure to high temperature."

Petrone and colleagues set out to test their hypothesis by subjecting the unknown material to proteomic analysis, which was conducted by Piero Pucci of the Centro di Ingegneria Genetica-Biotecnologie Avanzate in Naples. The five main proteins they isolated from the skull were adipic, margaric, stearic, palmitic, and myristic fatty acids. The researchers suggest that adipic and margaric fatty acids are "components of human hair fat," although their citation for this interpretation is nearly three-quarters of a century old, and margaric fatty acids have a history of misidentification. The other three proteins can be found in the human brain as well as in vegetable and animal fats. However, no other bones or wood that the researchers tested contained adipic or margaric fatty acids, suggesting they are from an unusual and/or localized material.

"The reported findings indicate that the vitrified black material is resulting from the victim's brain exposure to high temperatures," Petrone and colleagues suggest.

The assessment of the temperatures that people were exposed to during the eruption of Mt. Vesuvius, however, is an ongoing discussion among researchers working on archaeological sites in the area. While Petrone has previously argued for the idea of "vaporization" of soft tissue due to temperatures reaching over 500 degrees Celsius and igniting body fat, others disagree.

Tim Thompson, a forensic anthropologist at Teesside University in the UK, does not think that the vaporization theory is supported by experimental work or forensic cases, even at temperatures in excess of 1,000 degrees Celsius. He tells me by email that he's "not seen anything like this before, which is interesting in itself" but that "we need to do more research in this area to see if we can reproduce the conditions in which [the glassy material] formed to truly interpret its significance." In

his own forthcoming coauthored article in Antiquity, Thompson and colleagues alternatively propose that the Herculaneum victims may have been “baked” through low-intensity heat exposure.

Nevertheless, Petrone and colleagues’ description of the body on the bed in the College of the Augustales is intriguing. The skeleton has been badly damaged by one or more postmortem processes over the centuries, with discoloration of the surrounding ash matrix in several places. The skull has cracked margins similar to what Petrone found when studying other skeletons from the Herculaneum boathouses. Whether these are heat-induced changes and whether the intense heat killed these people rather than trauma from falling pumice or architecture are, however, open questions.

Petrone and colleagues appear to favor a cause of death at Herculaneum related specifically to the high heat, while Christopher Schmidt and colleagues have published their interpretation of cranial fracturing as a result of falling debris. Thompson and colleagues, on the other hand, rule out vaporization with their forthcoming research, and dismiss the idea that the volcanic surge carried enough debris to inflict large-scale traumatic injuries.

In my own research at the site of Oplontis, where we have analyzed 64 skeletons all found in one coastal room similar to the fornici of Herculaneum, the only evidence of burning came from bones next to oil lamps, which were presumably still lit when the people were overcome by Vesuvius. Few skeletons had evidence of perimortem trauma as well, in spite of the fact they were in a room on the ground floor of a two-story building. But it would not be unusual for skeletons at different sites to be subjected to different taphonomic processes.

We don’t yet know for sure all of the effects that the 79 AD volcanic eruption had on the human body, but the new research into cause of death and post-mortem activities is opening up an archaeological frontier in understanding what happened in the Bay of Naples that fateful day.

https://www.forbes.com/sites/kristinakillgrove/2020/01/22/mt-vesuvius-may-have-turned-ancient-roman-brains-into-glass/#3b7630fe353e

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