Brains Turned to Glass? Suffocated in Boathouses? Vesuvius Victims Get New Look

Two studies examined grim scenes left at a Roman settlement devastated by the 79 A.D. eruption.

Researchers studied the ribs of 152 individuals recovered from the boathouses of Herculaneum, the ancient Roman city destroyed in the eruption of Mount Vesuvius that also buried Pompeii.Credit...Jose Peral/Alamy

By Jennifer Pinkowski Jan. 23, 2020

The infants and children huddled in the stone boathouses. The women pressed in next to them. The men crowded in last. They'd all fled Herculaneum on August 24, 79 A.D. as Mount Vesuvius rained destruction on the city, as it did Pompeii and other Roman settlements near the Bay of Naples.

While Pompeii was consumed by ash, Herculaneum was done in by a pyroclastic flow — a fast-moving, dense, extremely hot surge of ash, gas and rock. At the city's seaside, hundreds of people died that day. The remains of 340 of them have been unearthed since 1980 — some in the boathouses, known as fornici, and some on the beach.

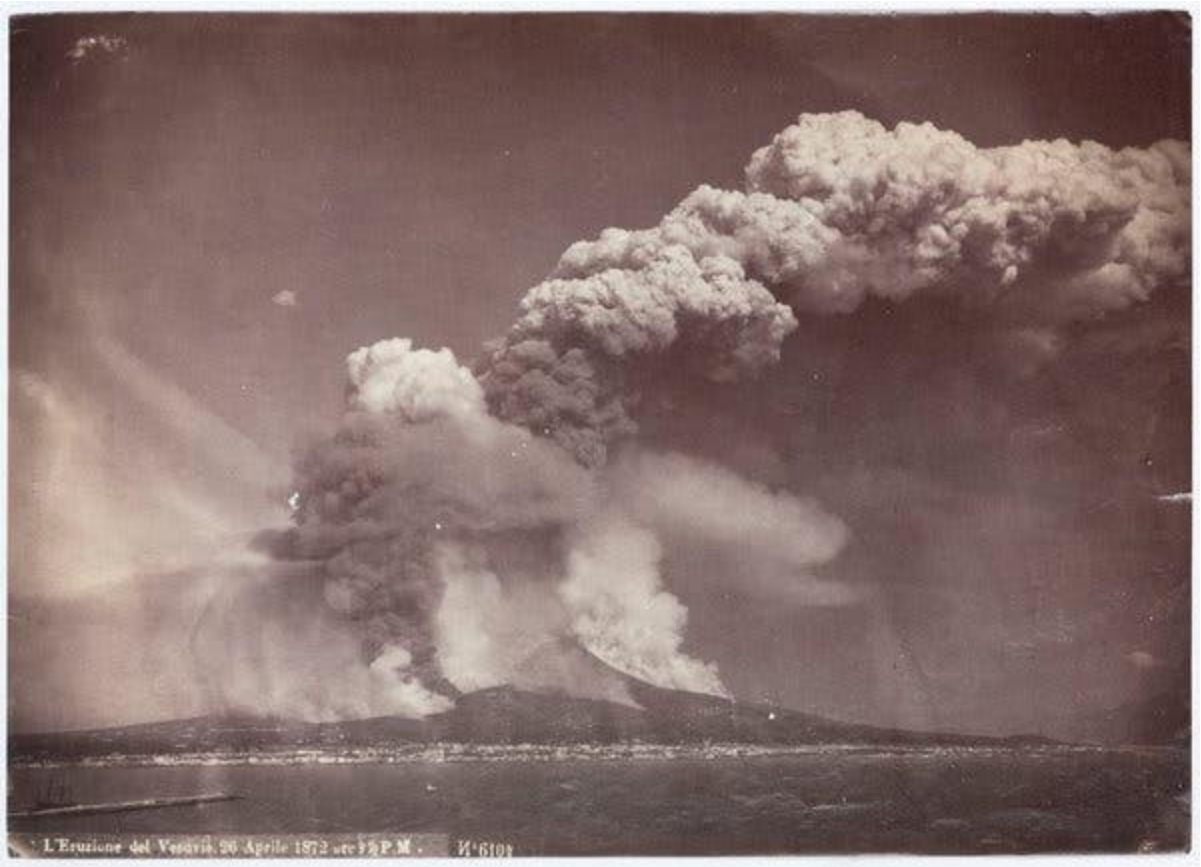
How they died has long been debated. A prevailing hypothesis is that their blood and brains were vaporized by the extreme heat of the pyroclastic flow. At another site in the city, some researchers have proposed that at least one person's brain turned to glass.

A pair of studies published Thursday offer new evidence for how the Vesuvius eruption killed some of Herculaneum's people. One in the journal Antiquity challenges the vaporization hypothesis. The researchers who published it say the condition of the bones of the people in the fornici suggest they were protected from instant death by both the stone structure around them and their collective body tissue mass. This protection

insulated them from the flow's intense heat, but they may have suffered more as they were perhaps suffocated or asphyxiated.

"The results that came back were slightly surprising," said Tim Thompson, a professor of applied biological anthropology at Teesside University in England and a co-author of that study. "That kind of forced us to rethink the accepted theory about how these individuals died."

Another team's results in the New England Journal of Medicine made the claim that the pyroclastic flow's heat vitrified the brain of at least one victim, transforming it into glass that was preserved for centuries.



Mount Vesuvius, during an eruption much later in April 1872.Credit...Science & Society Picture Library/Getty Images

The researchers of the first study looked at the ribs of 152 individuals found in six of the 12 boathouses. Adult women, infants and children outnumbered men by about two to one.

They focused on crystal microstructures in the bones, which change in response to thermal exposure, and the amount of remaining collagen. They separated the collagen from the bone, gelatinized it, dried it and weighed it. They then ground up the bone samples and fired infrared wavelengths into samples. The absorption or reflection of those wavelengths reveals both bone composition and changes in response to burning and heating.

The data showed that people in the boathouse were exposed to temperatures of about 500 degrees Fahrenheit — far from the maximum temperatures pyroclastic flows can reach.

Dr. Thompson believes there are two reasons for the results. One is that the stone boathouses protected people from the direct fire and heat of the flow.

"It's almost like a little oven, so it distributes heat differently," he said.

The number of people in each fornici may also have had an effect. Their combined soft tissues may have acted like a buffer against the heat. In this sense, they protected one another with their bodies.

But it may have also prolonged their agony. As the pyroclastic flow blasted the beach, debris would have piled up at the boathouse exits, trapping dust, gases and people within.

“I do think — and this is speculation — that they likely suffocated rather than died of the heat,” Dr. Thompson said.

The rising heat then baked, and preserved, their remains.

The vitrified remains of what some researchers say are a victim’s brain found at Herculaneum.Credit...Herculaneum press office, via Associated Press

“The authors make a convincing case for rethinking the temperatures that these victims of Vesuvius were subjected to,” said Kristina Killgrove, a bioarchaeologist at the University of North Carolina, Chapel Hill, who has studied skeletal remains at Oplontis, another Vesuvius-doomed settlement.

The second study examined a man found in the Collegium Augustalium, a building on the main street of Herculaneum, some distance from the seaside. His brain, said Pier Paolo Petrone, a forensic anthropologist at the University Federico II of Naples and an author of the study, turned to glass as a result of the high heat from the pyroclastic flow, and the victim’s skull exploded.

Dr. Thompson said the difference between his victims in the seaside and Dr. Petrone’s main street fatality might be explained by their distinctive shelters.

“Our individuals were in these kind of sealed, trapped stone oven-type things, whereas his individual was in a regular building — much more exposed and much more directly affected by the pyroclastic flow itself,” he said.

Dr. Petrone, who published a study in 2018 supporting the hypothesis that the boathouse victims’ brains were vaporized, was not persuaded by Dr. Thompson’s conclusion.

“The methodology is itself interesting, but the weak point of the work is that they did not sufficiently consider the whole set of taphonomic, bioanthropological and forensic evidence detected on the victims’ corpses and bones,” he said.

Dr. Thompson said the condition of the bones reflected events at the time of death, not the taphonomy, or changes that can affect remains post-mortem such as decomposition, scavenging or fossilization.

The forcini, or boathouses, of Herculaneum, where children, women and men huddled to escape the eruption.Credit...Enrico Della Pietra/Alamy

Dr. Killgrove was skeptical about Dr. Petrone’s finding.

“While their analysis is intriguing, I do not think they have proved it is human brain material, nor have they ruled out other origins,” she said. “The fatty acids they identified are typical of vegetable or animal fat or hair.”

Dr. Thompson added that the results from the two studies don’t necessarily contradict each other. “Both of these situations can happen at the same site, because it’s a very complex scenario.”

As research continues at the Vesuvius sites, Dr. Killgrove said Dr. Thompson’s study should inspire researchers to revisit the remains of other victims of the eruptions.

Some of the skeletons she studied at Oplontis, for example, have “high-quality collagen yields” similar to those in the Herculaneum boathouses, she said, suggesting heat-related changes to the bones were minimal: “This new work shows that researchers should renew their investigations into the causes and manner of death at Oplontis, Pompeii and other Vesuvian-area sites.”

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