

Study shows people died from body fluid vaporization due to pyroclastic flows from Vesuvius

October 10 2018, by Bob Yirka



Thermal effects in human victims' skeletons. A. Skull of an older-aged adult male showing a dark stained and cracked parietal bone (ind. 11, chamber 12). B. Skullcap affected by a “stellate” fracture consisting of several cracks which radiate from a common center, characterized by charred outer margins (adult male, ind. 31, chamber 10). C. Exploded skull showing a partly dark stained inner table (right side, adult male, ind. 6, chamber 12); charring of the fractured margins is evident (white arrows) (bar scale 10 cm). The skull of this victim was lying in the ash bed on its left side. Credit: *PLOS ONE* (2018). DOI:

10.1371/journal.pone.0203210

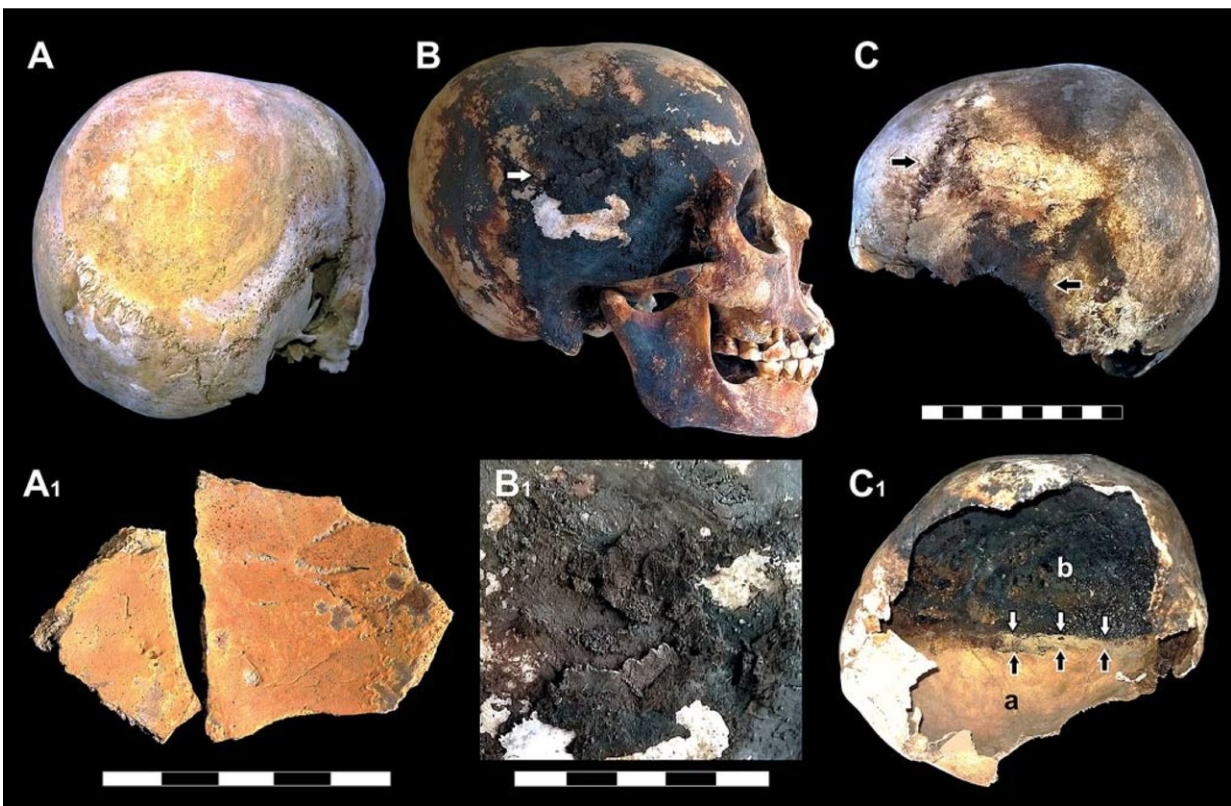
A team of researchers at the Federico II University Hospital in Italy has found evidence that suggests many people living in Herculaneum during the 79 AD eruption of Mt. Vesuvius were killed by the extreme heat characteristic of pyroclastic flows. In their paper published on the open access site *PLOS ONE*, the group describes telltale signs of heat damage they found in the remains of people living in the ancient Roman city at the time.

Most people learned in grade school that Mt. Vesuvius erupted back in 79 AD and covered cities such as Pompei in ash. So sudden was the disaster that many people were killed and buried in ash, leaving their "frozen" remains to be discovered by archaeologists approximately 1700 years later. Extensive research has shown that most of the victims in Pompei died from injuries or suffocation due to the thick ash. But this was not the fate of many people living in the nearby city of Herculaneum. The researchers with this new effort have found that many of them were killed by the extreme heat of [pyroclastic flows](#).

Pyroclastic flows are flows composed of gas and volcanic material—prior research has shown that they can flow downhill away from an eruption at speeds of up to 450 mph—and temperatures are as hot as 1000 degrees C. When a person is overcome by such a flow, the result is instant death. The researchers found evidence in the remains of many people who had sought refuge in a boathouse near the sea in Herculaneum. The team began their investigation after learning of reports of evidence of people dying from thermal shock.

Upon taking a closer look at some of the remains, the researchers found red and black [residue](#) on parts of some of the bones. Prior research

suggested that such residue typically occurs when bones are burned in the vicinity of coins or other metal objects—the residue typically consists of iron particles. Prior research has also shown that such residues can also be caused by blood being boiled away leaving behind suspended iron. Study of the residue showed that it was iron, though the researchers could not say for certain if it came from blood or metal objects. The researchers also found [evidence](#) of burst skulls, likely due to vaporizing brain matter.



Red and black mineral incrustations detected in the victims' skulls. A. Child's skull showing a round area of thick red mineral residues encrusting the right parietal bone (ind. 18, chamber 12); A1. Inner bone surface of parietal fragments encrusted by red mineral residues (sporadic skull fragments, adult, chamber 10); B. Skull showing dark staining and black residues encrusting (white arrow) the parietal and temporal bones (B1) (adult male, ind. 31, chamber 10); C. Skullcap of a young individual displaying spotted dark stained areas and charred open

sutures (black arrows) (ind. 29, chamber 12). The intracranial cavity (C1) shows a clear boundary (black and white arrows) between an inner table of unchanged color (a) next to a black stained one (b) (scale bars in cm). Credit: *PLOS ONE* (2018). DOI: 10.1371/journal.pone.0203210

More information: Pierpaolo Petrone et al. A hypothesis of sudden body fluid vaporization in the 79 AD victims of Vesuvius, *PLOS ONE* (2018). [DOI: 10.1371/journal.pone.0203210](https://doi.org/10.1371/journal.pone.0203210)

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