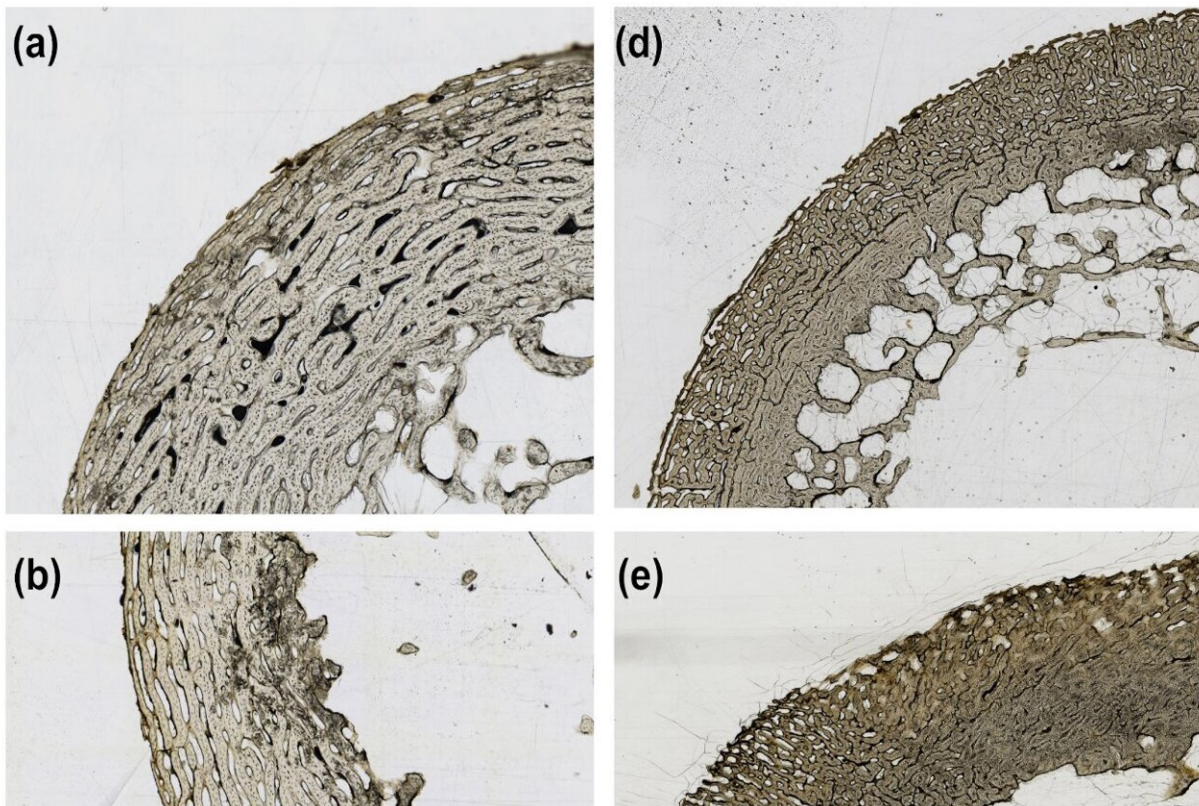


Forensic study sheds light on the remains of infants, children

March 16 2023, by Matt Shipman



Examples of tunneling index (TI) scores 1 to 3 for both fetal and juvenile sections from this study. (a) Fetal sample with a TI score of 1; (b) Fetal sample with a TI score of 2; (c) Fetal sample with a TI score of 3; (d) Juvenile sample with a TI score of 1; (e) Juvenile sample with a TI score of 2; (f) Juvenile sample with a TI score of 3. No samples were scored as 0 with no damage. Credit: *Biology* (2023). DOI: 10.3390/biology12030403

A new forensic science study sheds light on how the bones of infants and juveniles decay. The findings will help forensic scientists determine how long a young person's remains were at a particular location, as well as which bones are best suited for collecting DNA and other tissue samples that can help identify the deceased.

"Crimes against children are truly awful, and all too common," says Ann Ross, co-author of the study and a professor of biological sciences at North Carolina State University. "It is important to be able to identify their remains and, when possible, understand what happened to them. However, there is not much research on how the bones of infants and children break down over time. Our work here is a significant contribution that will help the medical legal community bring some closure to these [young people](#) and, hopefully, a measure of justice."

For this study, the researchers used the remains of domestic pigs, which are widely used as an analog for human remains in forensic research. Specifically, the researchers used the remains of 31 pigs, ranging in size from 1.8 kilograms (4 pounds) to 22.7 kilograms (50 pounds). The smaller remains served as surrogates for infant humans, up to one year old. The larger remains served as surrogates for children between the ages of one and nine.

The surrogate infants were left at an outdoor research site in one of three conditions: placed in a [plastic bag](#), wrapped in a blanket, or fully exposed to the elements. Surrogate juveniles were either left exposed or buried in a shallow grave.

The researchers assessed the remains daily for two years to record decomposition rate and progression. The researchers also collected [environmental data](#), such as temperature and soil moisture, daily.

Following the two years of exposure, the researchers brought the skeletal

remains back to the lab. The researchers cut a cross section of bone from each set of remains and conducted a detailed inspection to determine how the structure of the bones had changed at the microscopic level.

The researchers found that all of the bones had degraded, but the degree of the degradation varied depending on the way that the remains were deposited. For example, surrogate infant remains wrapped in plastic degraded at a different rate from surrogate infant remains that were left exposed to the elements. The most significant degradation occurred in juvenile remains that had been buried.

"This is because the bulk of the degradation in the bones that were aboveground was caused by the tissue being broken down by microbes that were already in the body," says Amanda Hale, corresponding author of the study and a Ph.D. candidate at NC State. "Buried remains were degraded by both internal microbes and by microbes in the soil." Hale is a research scientist at SNA International working for the Defense POW/MIA Accounting Agency.

The researchers also used [statistical tools](#) that allowed them to better assess the degree of [bone](#) degradation that took place at various points in time.

"In practical terms, this is one more tool in our toolbox," Ross says.

"Given available data on temperature, weather and other [environmental factors](#) where the remains were found, we can use the condition of the skeletal remains to develop a rough estimate of when the remains were deposited at the site. And all of this is informed by how the remains were found. For example, whether the remains were buried, wrapped in a plastic tarp, and so on.

"Any circumstance where [forensic scientists](#) are asked to work with unidentified juvenile remains is a tragic one. Our hope is that this work

will help us better understand what happened to these young people."

The research is published in the journal *Biology*.

More information: Amanda R. Hale et al, Investigating the Timing and Extent of Juvenile and Fetal Bone Diagenesis in a Temperate Environment, *Biology* (2023). [DOI: 10.3390/biology12030403](https://doi.org/10.3390/biology12030403)

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