Flesh-eating bugs get to work on creating animal bone dataset
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The beetles (dermestid beetles or Dermestes maculatus) cleaning the bones. Credit: Griffith University

Some creepy crawlies are helping a Griffith Ph.D. candidate on her quest to build a modern research library of animal remains. The bugs are cleaning the bones needed to catalog each species.

Tessa Knights, a Ph.D. candidate from Griffith's Australian Research Center for Human Evolution, is exploring an inexpensive and less destructive method of identifying bone material in the field and in storage collections by using bugs to clean the bones before using a portable X-ray-like machine to scan them for further analysis.

Knights' thesis is titled "The application and limitations of non-invasive portable X-ray fluorescence (pXRF) in the identification of archaeological osseous material." "Osseous" refers to bone material.

Fresh whole remains are delivered to her which she then strips down to bone. The beetles (dermestid beetles or Dermestes maculatus) clean the bones then Knights scans them as a modern reference for that species.

Knights said there is anthropological evidence that animal bones were used by Indigenous Australians for tools and weapons, but researchers were rarely finding them at archaeological sites.

"Are they in the fragmented material in stored collections? That's what I'm hoping this method can be used for, to help fill in those gaps and round out our understanding of how humans were affecting animal populations in the past," Knights said.

"I'm essentially working on developing a new way of identifying bone material, and currently the only way to identify it when it is fragmented is to do DNA analysis or genomic testing, which can be destructive to the bone samples."

"Usually the entire bone is ground up to work out what it is but then of course, you don't have the fragments anymore."

The idea for addressing this issue stemmed from Knights' Honors project, in which she worked with other researchers from ARCHE to question the lack of archaeological evidence of thylacines being hunted by Indigenous Australians.

The only way to sift through unidentified bone collections and pinpoint whether there were examples of hunted thylacine bones present was to do so in a non-destructive way.

It was then that Knights decided to explore the use of pXRF to examine the composition of these unidentified bones to answer some of these archaeological riddles.

"Each species limits what minerals and metals their body will accumulate safely," Knights said.

"But that varies between species, every species has very different needs for what levels are stored in their bodies."
"For example, mammals and birds are completely different because birds need to be able to fly so their bones are hollow and the elemental composition will be different.

"My research is trying to find what those differences are and how far down we can identify species levels, so we can tell kangaroo bones from wallaby bones."

Elements make up everything, so when working on an elemental scale, having reference bones that have a detailed preparation history helps you determine what is part of the bone "signature" and what is coming from outside sources such as sediment or chemical treatments.

Provided by Griffith University

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