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Dassie's toilet etiquette helps UCT researchers learn about climate change

Unlike a dog that will do his business all over the yard, a rock hyrax – also known as dassie or *Procavia capensis* – will, for his number ones and twos, go to the same spot as the rest of his colony, year in, year out.

For paleo-environmentalists keen to paint a picture of long-term climate and vegetation change, that toilet etiquette has made the diminutive dassie an unrivalled collaborator. Over tens of thousands of years, these sticky dunghills (some of them the size of a small car) trap stable isotopes (atoms) and pollen that become chronologically stratified, one layer neatly stacked atop another. In a lab, a generous chunk of hardened midden can be radiocarbon-dated, while pollen is cross-checked to identify the plants that produced it. The result: one of the most accurate and high-resolution records of changing climate and vegetation patterns researchers have found so far.

For this reason, for some time now Professor Mike Meadows and his students in the Department of Environmental and Geographical Science at the University of Cape Town have been digging into dassie dunghills.

So far they have been limited to dassie colonies in the Western Cape, Northern Cape and Namibia, but now they can cast their nets wider, thanks to €1.4 million funding secured from the European Research Commission by one of Meadows' collaborators, former postdoctoral research fellow, Dr Brian Chase.

Now based in France at the University of Montpellier, Chase will serve as principal investigator and Meadows as co-investigator on a five-year study: "HYRAX: Rock Hyrax Middens and Climate Change in Southern Africa During the Last 50 000 Years". With Cape Town as base camp, the scientists will strike out for dassie colonies in three different directions – the first deep in Namibia; another along the south coast into the Eastern Cape; and then inland, cutting across the Northern Cape, the North West Province and Botswana before ending in Zimbabwe.

Meadows explains that in the largely semi-arid and arid regions of Southern Africa, dassie middens trump just about anything else in the palaeo-environmentalist's arsenal, such as organic-rich sediments that are restricted to wetlands.

Dassies are small mammals that live in colonies. They are spread across much of Africa and are common in rocky places where they shelter in caves or overhangs –where the "latrines" are found.

The fine temporal resolution in these instances surpasses any other kind of archive. For example, lake sediments found in cooler areas like Scandinavia provide only an annual signal of possible climate change. Dassie dunghills, on the other hand, contain a record that could be narrowed further down to analyse even monthly signals of climate or vegetation change. The archive can provide high resolution data for models that are used to forecast future climates.

With that record in place, scientists can follow a climatological timeline to better predict what should be happening over the next few hundred years.

So far, findings from middens in Spitskop, Namibia, reveal details of a progressive drying trend in that region over the last few thousand years. Material from the Cederberg in the Western Cape, on the other hand, has revealed a markedly cooler and drier phase after the end of the last glacial period that is thought to be a response to changes in global ocean circulation.

"The beauty of the hyrax middens is that they accumulate, sometimes for many tens of thousands of years, more or less continuously," says Meadows. "And to have records at that temporal level of resolution, I think, is a major breakthrough."

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