A freezing mountain refuge reshapes early human survival, hinting at an unseen advantage

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Kristin Cimmerer of University of Toronto, Mississauga, and Kyra Pazan of California State University, Stanislaus, excavate Likonong Rock Shelter in the mountains of Lesotho. Here, an international team of archaeologists from the United States, Canada, the United Kingdom, and Lesotho have identified the earliest sustained human occupation in Highland Southern Africa. Credit: Kyra Pazan, California State University, Stanislaus

Archaeologists have identified the earliest sustained human occupation in Highland Southern Africa, and suggest it could not have existed without considerable collaboration at a time when we were becoming humans.

Researchers from the University of Michigan and California State University, Stanislaus, have discovered that a rock shelter in the highlands of Lesotho, a tiny country enveloped by South Africa, was occupied by humans as early as 242,000 years ago.

This coincides with the time that Homo sapiens began to emerge and more than triples the age of similar sites in the region. The finding is also significant because the higher elevation of this site means humans traveling to the shelter would have successfully navigated harsh winter conditions.

"Likonong is one of the only sites we know of from this time period, and it's really interesting that we're seeing success in this environment at the same time that we ourselves are becoming human," said Kyra Pazan, assistant professor of anthropology at California State University, Stanislaus, and U-M alum.

The findings are published in *Archaeological and Anthropological Sciences*.

How life unfolded at Likonong

While the earliest occupations of the site were ephemeral—humans appeared to be visiting seasonally and were not staying long enough to build fires, or visiting during times they weren't needed—the rock shelter became more frequently occupied over the next 200,000 years.

Occupation of the site appears to intensify during a warm period 130,000 years ago, but also continued through about 90,000 years ago, during one of Earth's ice ages.

That humans were able to survive in these conditions suggests that they were highly collaborative and able to adapt to harsh environments, says study co-author Brian Stewart, associate professor in the U-M Department of Anthropology.

"There is an evolutionary story here, and that is that Homo sapiens were very, very good at settling new habitats. The question is: when and in which selective contexts in Africa did these things begin?" Stewart said.

"It's pretty suggestive of some major changes happening, if not cognitive, then in how societies were organized and networked, and also perhaps in how such changes affected technologies: innovation in terms of cold weather clothing or those types of things. Time will tell, but there seems to be a change in sequence at Likonong."

A shelter that rewrites assumptions

Likonong, pronounced "Dikonong," was discovered in 1995, but Pazan delved more deeply into the site in 2023. Initially a cave-like space, its roof collapsed at some point after occupation, preserving human activity within the shelter. The shelter itself is about 52 meters end to end; with its roof collapsed, the sandstone cliff that composed its back wall is now visible.

It's a site that challenges previous assumptions about why humans and human ancestors were slow to settle mountainous regions, Pazan says.

Archaeologists have generally thought the low oxygen, or hypoxia, of high altitude regions may have limited early human success in these

areas. But Homo erectus, one of our ancestors, settled at high altitude sites in Ethiopia as early as 2 million years ago, and at 6,000 feet, Likonong is at an elevation where oxygen isn't as scarce.

"The fact that Likonong and Lesotho in general didn't see any sustained occupation until Homo sapiens came around is significant because it suggests that maybe hypoxia was not the issue. Maybe it was temperature and knowing what's available at specific times of the year," Pazan said.

"I think Ethiopia shows that we can be at high altitudes if it's warm enough and if resources are predictable. But it takes a little extra adaptive ability to live in a place that gets so cold and has these really dramatic swings in resource availability, even if there's plenty of oxygen there."

Collaboration as our ancient advantage

Something that made Homo sapiens highly successful was our ability to adapt to different environments, Stewart says. But human adaptation is much more than just biological: people need other people.

"We came to be a successful species by creating long-lasting, very deep friendships that spread over land," Stewart said. "You need to have clothing, ready access and instant ability to make fire, and you probably need cooking techniques that soak every last fat out of the kind of food you're getting. But these things are not the be-all, end-all. Social cooperativeness, having fallbacks, and having a risk distribution across the landscape if things go wrong are just as critical."

It's a lesson that Pazan hopes we won't forget.

"From the very beginning, we were only able to solve these environments by working together as a group and collaborating toward better

solutions," Pazan said. "If that's how we began as a species, then perhaps that is key toward our survival here on Earth today. If we forget that, we're forgetting a little bit about what it is to be human in the first place."

More information: K Pazan, et al. Evolving entanglements with highland southern Africa: Site formation, initial chronology, and occupational pulsing during the Middle Pleistocene at Likonong Shelter, Lesotho, *Archaeological and Anthropological Sciences* (2026). doi.org/10.1007/s12520-026-02459-9

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