Researcher explores Spanish cave to find why early humans replaced Neanderthals in Europe

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ASU researcher Ana Pinto is shedding some light on an age-old mystery in anthropology: What was the relationship between Neanderthals and early humans?

Pinto's findings of the remains of a modern human culture stacked directly atop remnants of a Neanderthal dwelling in a Spanish cave are shedding light on the historical mystery and providing evidence for just how those species may have lived and interacted with their environment.

In 2002, while Pinto was working as a county archaeologist in northern Spain searching for archaeological sites in the Cordillera Cantabrica mountain range, she noticed a peculiar rock outcropping out her window while driving past.

"I had a feeling that there was a cave in that rock," says Pinto, who completes her ASU postdoctoral research in September. "And if there was a cave, there was a chance for human occupation. I thought to myself, 'If I were a Neanderthal or an early human, that's where I would choose to live.' "

Pinto, who recently returned to Spain to continue her research, says the outcropping had a vaulted, dominant position peering down the mountain. It overlooked the whole valley, with a stream meandering close by the site. The scene had everything an early hominid could ask

for: water, plentiful food sources, shelter and protection.

“Good real estate,” Pinto says.

So she set out to investigate the area, and her determination paid off in a big way. As she suspected, the rock outcropping housed a rock shelter at its base. At first glance, the 10-square-meter (30-square-foot) limestone enclave seemed little more than a rocky overhang, but the environmental and topographical conditions would have made this shelter an ideal habitat. Whose habitat, though, remained a mystery.

The site is called Sopeña, which in Spanish means “under the rock.” Pinto began a test excavation – which involves digging a narrow, deep trench to gain a rough estimate of what lies beneath – revealing 16 layers of rock and sediment.

Caves are excellent safekeepers of fossils because they are very stable, sheltered environments, Pinto says. Limestone, common in caves, helps preserve bones.

But caves have their pitfalls as well. The activation and reactivation of water systems and underground rivers inside the caves are affected dramatically between periods of glaciation, the periodic formation and movement of massive ice sheets. This can wreak havoc on a cave, scattering and sometimes washing away fossil evidence. Sopeña proved to be a rare, exquisitely intact specimen.

After sifting through a meter-deep bed of manure, Pinto found an assortment of small stone tools and bone fragments. Among these, a few larger stone blades were discovered.

“Stone blade tools are usually thought to be associated with the arrival of the earliest modern humans in Europe,” Pinto says. “So this discovery

gave the first indication as to the probable age of 34,000 B.C. for the upper layers of the site."

A small, pointy bone tool provided even more clues. The bone point in archaeology is known as a fossil director, a relic that uniquely indicates the area in which it was produced. The base of the bone point was broken, which prevented precise knowledge of when it was fashioned, but it was enough to confirm for Pinto that this cave dwelling once belonged to the Aurignacian culture, the very earliest modern humans to arrive in Europe about 30,000 years ago (28,000 B.C.).

When the team's test excavation reached the 12th level, they found what they had been hoping for: primitive scraping tools, fashioned out of retouched stone flakes, lying next to bone fragments of some prehistoric feast. The tools differed from those normally associated with modern humans, indicating they belonged to a Neanderthal culture.

Given that Pinto's evidence shows that Neanderthals and modern humans shared a common location at a time when evidence shows that both species may have been in Europe, it seems likely that the two species would have encountered one another.

Looking to further her research, Pinto discovered that ASU's Institute of Human Origins (IHO) had tools and personnel to assist her. She contacted Curtis Marean, a professor with the IHO, who arranged for her postdoctoral research at ASU in 2002.

Pinto's goal is to discover definitive evidence for why humans eventually replaced Neanderthals in Europe. Her work has garnered attention from benefactors like the Wings WorldQuest organization, which awarded her a $10,000 grant and a subsidy from the National Geographic Society.

Although Pinto is back in Spain, she plans on maintaining the working

relationships she has made at ASU so that graduate students, professors and researchers can assist her in her discoveries.

“Sopeña is outstanding because it has a continuous registry of events along the 25,000 or so critical years of human evolution consisting of the transition from Neanderthals to modern humans,” Pinto says. “The archaeological levels of this site read like the pages of a book.”

So far, 16 layers of Sopeña’s stratigraphic column have been seen with the test excavation. The excavation crew has only thoroughly explored the topmost layers, but Pinto is confident that her research will result in a better understanding of the history of early humans and Neanderthals.

“The general public is thrilled with spectacular, single discoveries like Tutankhamen’s chamber in Egypt or the Neanderthal burial sites in France ,” Pinto says. “But that is not what we are about. Spectacular discoveries can be made over the course of the excavation of Sopeña, but what we are trying to do is reconstruct the paleoecology and human behavior during the later stages of human evolution.”