

## Spain's Lead-Lined Lakes

Researchers from the University of Granada collected mountain lake sediments from Laguna de Río Seco in southern Spain that had accumulated over 10,000 years, trapping deposits from the atmosphere. In these stacks of mud, they found fine layers of lead that reveal millennia of metalworking and migration, and may be the oldest evidence of air pollution in southern Europe. “[The mud] has been capturing the evolution of air pollution from the Neolithic to present times and giving us an idea of the activity of each of the populations that have passed through southern Iberia,” says team leader José Antonio Lozano, “such as the Phoenicians, Romans, Visigoths, Moors, and more.”



The team dates the first man-made uptick in pollution to between 3,900 and 3,500 years ago, which matches the appearance at nearby sites of coins, weapons, and decorations that, when made, left behind lead by-products. The lead records also attest to a quiet period, when mining moved elsewhere in Iberia, and to a spike corresponding with a period of Roman mining. But all those signals are dwarfed by a more modern surge, which the team attributes to the leaded gasoline in heavy use from the 1950s to the 1970s. The good news, the researchers report, is that present-day lead levels are already below those of the worst Roman deposits.

—LUCAS LAURSEN

## In Style in the Stone Age



Even Paleolithic people knew that while fashions fade, style is eternal. A team led by University of Bordeaux archaeologist Marian Vanhaeren found that beaded necklace patterns changed in a relatively short time around 75,000 years ago, possibly within a few generations.

Vanhaeren and her colleagues analyzed shell beads from Blombos Cave, South Africa. Beads from two separate layers displayed patterns of wear distinct from one another, which suggested that they had been strung and worn differently at different times. The archaeologists made some beads of their own and strung them in a variety of styles. They then subjected them to use, and exposed them to a water-and-vinegar solution meant to mimic human sweat and accentuate the marks that came from everyday wear. “Voilà,” says Vanhaeren, “we had the wear patterns.” From the experiment, she concluded that in the older layers, shells hung freely on a string, while in the upper layers the shells were knotted together in a more complex pattern (above). Vanhaeren notes that the beads in both layers probably came from numerous necklaces. “All the people respected the rules and wore the beads in these specific patterns,” she says. In other words, the Blombos Cave people were slaves to fashion.

—ERIC A. POWELL

## Portals to the Underworld



For the ancient Mesopotamians, hell was a distant place, across an ocean of death, located at the end of the world. But for the ancient Greeks and their Neolithic ancestors, the gates to the underworld were not that far away at all.

Earlier this year, University of Salento archaeologists announced the discovery of one such portal at the Greco-Roman city of Hierapolis in southwestern Turkey. The team located a cave at the site that emits poisonous gases and was thought in antiquity to be an entrance to Hades. Known as “Pluto’s Gates,” for the god of the underworld, the cave is near the remains of a temple where the archaeologists found a column bearing a dedication to the god and his wife Kore, or Persephone.

Not far away, excavations at a cave at Alepotrypa in southern Greece (left) suggest that the Greek concept of the underworld, on display at Hierapolis, may have originated in the Neolithic

period. The entrance to this cave collapsed 5,000 years ago, preserving evidence that Neolithic people lived there, and that others made pilgrimages there from afar to bury their dead. Millsaps College archaeologist Michael Galaty, who works at the site with a team led by Greek archaeologist Giorgos Papathanassopoulos, says his colleagues believe the site took on mythological significance. “Giorgos thinks that when the cave collapsed and everyone left, they took this cultural memory with them of an underground realm where they buried the dead,” says Galaty. “This could be the source of the Greek fascination with the underworld.”

—ERIC A. POWELL