

and psychologists. Gregory Francis, a cognitive psychologist at Purdue University in West Lafayette, Indiana, who has investigated several cases of misconduct, says he finds them “very convincing.” The complaint “made plain that the reported data are too good to be true. There is little doubt of that,” adds social psychologist Brian Nosek of the University of Virginia in Charlottesville. Francis and Nosek say more of Förster’s papers should be put under the microscope, as happened with Stapel and Smeesters after the first evidence of fabrication surfaced.

But Sherman says he’s giving Förster the benefit of the doubt. “Even if we all agree that the data are unlikely, that does not

necessarily indicate fraud,” he says. “It is not clear exactly why the data turned out the way that they did. We may understand later what we cannot understand now.” Förster’s Ph.D. adviser, social psychologist Fritz Strack of the University of Würzburg in Germany, also cautions against a rush to judgment. “Jens Förster was an outstanding doctoral student about whose integrity I have never had any doubts,” he says. *SPPS* editor Allen McConnell says UvA has not yet contacted him about the disputed paper.

Dutch scientists, meanwhile, are left to wonder if the string of misconduct cases—there have been several more in fields other than psychology—means there is something

rotten in their science system. LOWI, which handles only appeals, has seen its caseload triple since the Stapel affair, with a record 19 cases in 2013. But LOWI Chair Kees Schuyt, a professor emeritus of sociology at UvA, says the increase just shows that whistleblowers in the Netherlands now know what to do. In a recent interview in *NRC Handelsblad*, Schuyt said: “Because of all the publicity about scientific misconduct, people know better how to lodge a complaint within a university and how to appeal to LOWI.”

—FRANK VAN KOLFSCHOOTEN

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## ARCHAEOLOGY

# New Sites Bring the Earliest Americans Out of the Shadows

**AUSTIN**—The sun was setting as archaeologist Kurt Rademaker climbed past 4500 meters in the Andes Mountains of Peru. His goal was to find the source of the obsidian that ancient people on the coast of Peru had used to make stone tools. But right then, “I was looking for someplace to spend the night,” Rademaker says. “I popped over a ridge, right into a rock shelter”—a natural shelter that promised to be a good campsite. That evening he noticed hundreds of black obsidian and red and gray jasper tools littering the area. He’d unknowingly set up his tent right atop the ancient people’s camp.

Several more trips up the mountain revealed something even better: a piece of human skull buried near the bones of wild vicuña, guanaco, and deer—the remnants of prehistoric barbecues in the rock shelter. At the meeting of the Society for American Archaeology\* here, Rademaker announced that the animal bones date between 12,000 and 12,500 years ago, meaning that the people feasting high in the mountains were among the early inhabitants of the New World. “We have the **highest Ice Age site in the Americas with a really successful human occupation**,” says Rademaker, an archaeologist at the University of Maine, Orono.

Rademaker is one of a new generation of archaeologists searching high and low for new evidence of early Americans—and finding it. Now that most of the field has accepted that humans settled in America before the famous

Clovis hunters (*Science*, 25 March 2011, p. 1512), young researchers are staking their careers on a new set of questions. Who were these pre-Clovis people, how quickly did they fan out after arriving from Asia, and how did they adapt to new terrains? Clovis hunters were people of the plains of North America, but researchers are now finding traces of Paleoindians atop mountains in the



**Ancient footsteps.** The earliest Americans left tools and bones at multiple new sites (dates in years).

Sierra Madre and Andes and at the bottom of sinkholes in Florida. They are fleshing out the ghostly outlines of these nomadic people, who spread through North and South America 12,000 to 15,000 years ago.

As a procession of young researchers took the podium at the meeting, several older advocates of pre-Clovis settlement stood back and beamed. “This symposium with so many young South American scholars presenting such good interdisciplinary data would have been impossible 10 years ago,” says archaeologist Tom Dillehay of Vanderbilt University in Nashville, who excavated Monte Verde, a crucial pre-Clovis site in Chile. “It’s nice to get beyond the Clovis versus pre-Clovis debate.” Geoarchaeologist Michael Waters of Texas A&M University, College Station, agrees: “There’s definitely a sense of change in the air.”

A generation ago, most researchers thought that the first Americans were the Clovis big-game hunters, who left their distinctive fluted spear points in the open basins and ranges of North America starting about 13,000 years ago (*Science*, 23 February 2007, p. 1067). Few believed the scattered claims for Paleoindians before Clovis, and the doubts squelched funding for research that might have sped the acceptance of older sites.

But over time, the evidence for pre-Clovis sites became incontrovertible. The first to be widely accepted was the ancient campsite at Monte Verde. Now reliably dated by radiocarbon to 14,800 years ago, it is the oldest accepted human site in the Americas. Today almost a dozen sites “provide credible

\*79th Annual Meeting of the Society for American Archaeology, 23–27 April, Austin.

evidence” for pre-Clovis settlement, Waters says. “At a minimum, people were here 15,000 years ago, and probably before that.”

Some new evidence is coming from reanalysis of sites where pre-Clovis claims were initially challenged, such as the Page-Ladson sinkhole beneath the Aucilla River in Florida. At this site an hour east of Tallahassee, archaeologists found stone flakes and a mastodon tusk with cut marks in the 1980s and 1990s. Dates of 14,000 years ago seemed too early to be credible. But geoarchaeologist Jessi Halligan of the University of Wisconsin, La Crosse, has returned to the sinkhole. In 2012 and 2013, she and her team dove nearly 8 meters through murky water to excavate the oldest layer of sediment. In 2012, they found bones from a mastodon, bison, and horses. Then, last summer, “we got lucky,” she says.

Two divers were digging in the muck when graduate student Morgan Smith of Texas A&M hit the edge of something hard with his trowel. “Morgan comes boiling up to the surface, shouting ‘I have a biface; I have a biface!’” recalls Waters, co-organizer of the expedition, who was safely dry on a boat. A biface is a stone blade unquestionably modified on two sides by humans.

Halligan immediately descended herself, took photos of the biface, and gathered samples of the strawlike layer of mastodon dung (called *digesta*) where it was found for dating. The radiocarbon dates confirmed that Paleoindians were there about 14,500 years ago, Halligan says. The dates also raise new questions: “If we start to accept that there are sites on the east coast at 14,500 and in South America at 14,800, what does that mean for when people first got here?” she says. “Were they on a superfast march across the country or did they get here 15,000 or 16,000 years ago?”

Judging from the talks at the meeting, the earliest explorers spread rapidly into all sorts of terrain, ranging from the desert of Zacatecas, Mexico, to the rainforests of the Amazon. By the time they left tools at Rademaker’s site about 12,000 to 12,500 years ago, these ancient Americans were even able to survive in the extreme high altitude of the Andes. Rademaker thinks they moved seasonally between the

mountains and the sea, because obsidian from near the shelter was used to make tools 150 kilometers away at Quebrada Jaguay on the coast of Peru, home to an ancient maritime culture 12,500 to 13,000 years ago (*Science*, 18 September 1998, p. 1775).

More signs that the first Americans rapidly colonized many different environments come from Mexico, where archaeologist Ciprian Ardelean of the Autonomous University of Zacatecas surveyed the unexplored Zacatecas desert for traces of Paleoindians. At Chiquihuite Cave, almost 3000 meters

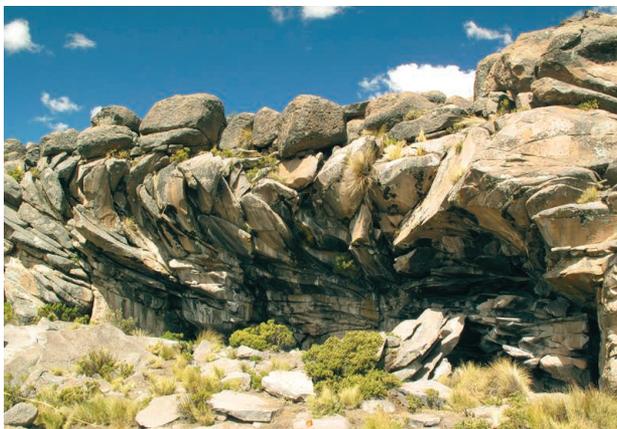
up in the Sierra Madre, he and a small team found a bifacial point. Inside the cave, they dug test trenches that exposed the bones of animals and traces of ash including burned phytoliths, or plant minerals. Two dating methods (radiocarbon on animal bone and an optical date on the sediments) both suggest the site predates Clovis, although Ardelean is cautious: “Two dates are not enough to establish reliable antiquity.”

Far to the south in the Aisén region of Patagonia in Chile, archaeologist César Méndez of the University of Chile in Santiago and his colleagues are also surveying a large area, where they are correlating local climate and environmental data from the past 19,000 years with ancient campsites. On a tip from a rancher, they explored one cave—Cueva de la Vieja (Old Lady’s Cave)—where they found hearths and stone tools that date to 11,870 years ago. By analyzing seeds and tools at that site and others, Méndez’s team has found that in Patagonia, the early people sought places where they could gather berries as well as hunt foxes, armadillos, and other small animals, so they weren’t entirely dependent on big game. “It gives us a pretty good idea of the kind of environment human beings preferred,” Méndez says.

No longer seen as the first Americans, the Clovis people are also looking less distinctive. At the meeting, archaeologists reported finding three different types of projectile points at sites in Tierra del Fuego and Uruguay. Among them: stemmed, fluted “fishtail” points reminiscent of Clovis points in appearance and age, dating as far back as 13,000 years ago in Uruguay. Finding similar points 10,000 kilometers apart led some researchers to suggest that the Clovis and South American traditions both arose from an earlier culture that already made bifacial points—an ethereal group whose traces are now being detected in North and South America.

“I think it’s irrefutable that by 13,000 years ago, South America was occupied by people with their own cultural and technological tradition,” Waters says. “It was not Clovis people marching south.” Adds Rademaker: “What we have is these ancient people emerging everywhere.”

—ANN GIBBONS



**Gimme shelter.** Paleoindians camped at Cuncacha rock shelter in the Andes of Peru (top), Cueva de la Vieja in Patagonia, and Chiquihuite Cave in the desert of Mexico.

CREDITS (TOP TO BOTTOM): KURT RADEMAKER; PABLO GONZÁLES; CIPRIAN ARDELEAN