Pre-Clovis Sites Fight for Acceptance

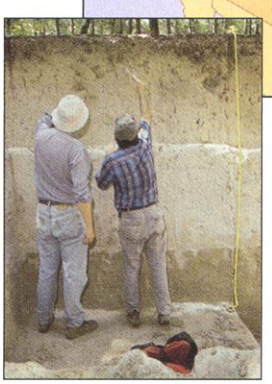
A handful of archaeological sites across the Americas are modern-day battlegrounds, where iconoclastic researchers struggle to prove their claims of very ancient peopling of the Americas

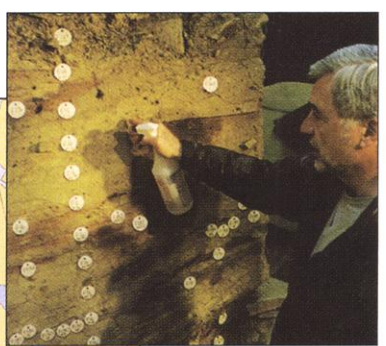
COLUMBIA, SOUTH CAROLINA—Al Goodyear sees himself as a conventional archaeologist—or he did until a couple of years ago. He works in the state archaeologist's office here, has a faculty position at the University of South Carolina just across the street, and is known as an expert on Paleo-Indian artifacts in the Southeast. But Goodyear says his career took a radical turn after he began to explore a site called "Topper."

As Goodyear tells it, in May 1998 his team got flooded out by the Savannah River about 137 kilometers southwest of Columbia. Retreating to higher ground, he led his volunteers, who had paid about $300 a week to participate, up a sandy hillside to the site of a previous excavation, named after forester David Topper, who pointed it out. Here, Goodyear and his volunteers dug deep, beyond a depth that conventional wisdom regarded as sensible, below the "Clovis level" that marks what archaeologists have long considered the first human occupation of the Americas (see sidebar on p. 1732).

Gregarious and affable—known to friends as the state pork barbecue champion of 1977—Goodyear was not looking for controversy, and he says he expected no traces of human activity at this depth. Like many of his peers, he believed that the Clovis big-game hunters, with their distinctive fluted spear points, were the first to arrive in the Americas, about 12,000 years before the present (BP).* However, Goodyear knew that supposed pre-Clovis artifacts had been found at more than half a dozen North and South American sites, and he decided it would be "irresponsible" not to look at this one. He explains: "I hadn't done it before, because you don't look for what you don't believe in."

Goodyear was "shocked" by what his volunteers began to unearth from below the Clovis level: small blades of chert, chiseled stone "burins" or needles—possibly for decorating bone—and other fragments. His team found no biface tools or charcoal for dating, which would make the artifacts more convincing. But Steven Forman of the University of Illinois, Chicago, dated the sand just above these microlithics by optically stimulated luminescence to an age of about 15,500 calendar years or a radiocarbon date of about 13,000 years BP, says Goodyear—making them clearly pre-Clovis. These findings haven't been published, but skeptics tend to accept Goodyear's dates and geology; what they question is whether the stone pieces were made by humans.





The pre-Clovis trail. Excavators seek evidence of very ancient Americans in artifacts from (clockwise from top) Cactus Hill, Topper, Meadowcroft, and other sites .

Suddenly Goodyear had crossed the line, challenging the orthodoxy of North American archaeology. It's a weird feeling, he says, to be "putting a career of 30 years on the table." But there's no turning back.

Topper's visibility—the site has been mentioned already in four national magazines—has added momentum to the pre-Clovis movement, but Topper is hardly unique. Today, advocates of pre-Clovis immigration can cite a string of evidence—ranging from tools from the 16,000-years-BP-or-older Bluefish Caves in Alaska's Yukon, to a 12,500-years-BP dwelling at Monte Verde in Southern Chile—that points to a very early human presence (see map). Although none of these sites might be persuasive on its own, taken as a group they appear to be winning converts. Says archaeologist David Meltzer of Southern Methodist University in Dallas, Texas: "The gates have been thrown open" to new ideas.

All the same, Goodyear and his fellow iconoclasts have not won full acceptance. Leaders in the field remain skeptical, noting that the evidence from pre-Clovis sites is patchy and uneven, unlike the powerful stone record of the Clovis people. "I've been looking at this for 40 years," says C. Vance Haynes Jr., the eminent University of Arizona, Tucson, archaeologist. He finds it hard to accept that it is just "a coincidence" that the Clovis evidence lies atop layers that at "site after site" contain no trace of humans. He and other skeptics have challenged pre-Clovis finds, questioning everything from dates to stratigraphy. A close look at a few of the most important and controversial sites illustrates why it is so difficult to prove very ancient occupation—and why the peopling of the Americas remains an open question.

CREDITS: (PHOTOS, CLOCKWISE FROM TOP) JOSEPH MACAVOY AND LYNN MCAVOY; E. MARSHALL; DARYL P. MILLER PHOTOGRAPHY

* Dates in this story are corrected radiocarbon dates.

Monte Verde and beyond

The most accepted pre-Clovis site—although it still has skeptics—is Monte Verde, in south-central Chile. It took 2 decades for it to be recognized, and its principal investigator, Tom Dillehay of the University of Kentucky, Lexington, campaigned hard to win converts. His work centers on what appears to be an ancient dwelling in an upland bog 56 kilometers from the Pacific coast. Beside a small creek, Dillehay and his group unearthed the remains of several primitive structures, stone and wood implements, fire pits, and chewed plant cuds. The quantity of evidence is massive, but the carbon dates were controversial: Some reviewers had balked at dates of at least 12,500 years BP—long before the Clovis people set foot in North America.

In 1997, Dillehay invited a panel of well-known archaeologists to the site, handing each of them a bulky site report published by his sponsor, the Smithsonian Institution. The members responded with a unanimous vote of confidence (*Science*, 28 February 1997, p. 1256). Even Haynes, who felt he was included as the odd man out on the panel, accepted the early date.

That acceptance, according to Meltzer, "broke the logjam" of skepticism about pre-Clovis dwellings. It also helped that Clovis-contemporary or pre-Clovis sites have popped up in Venezuela and Brazil (*Science*, 19 April 1996, pp. 346, 373). Considering all the evidence, Meltzer adds, "it's striking that there's so much material at 11,000 years BP in South America; it suggests that people had been there a long time."

But even Monte Verde has been challenged again. In 1999, archaeologist Stuart Fiedel, a pre-Clovis skeptic at the consulting firm of John Milner Associates in Alexandria, Virginia, blasted the quality of Dillehay's site report in a long critique published in the popular journal *Discovering Archaeology*. Fiedel found many glitches, noting for example that key artifacts were described as being unearthed in different locations (*Science*, 22 October 1999, p. 657). Although Meltzer and others say Fiedel's review was nitpicking and unfair, it had an impact. Haynes again began to raise questions about whether the artifacts might be younger objects mixed with older material and animal bones in a flood of glacial water.

Meadowcroft

If Monte Verde has earned respect, although not wholehearted acceptance, another veteran site, the Meadowcroft Rock Shelter in western Pennsylvania, still struggles for recognition. Its fate—3 decades of bitter argument over its antiquity and credibility—illustrates precisely what Goodyear would like to avoid at Topper.

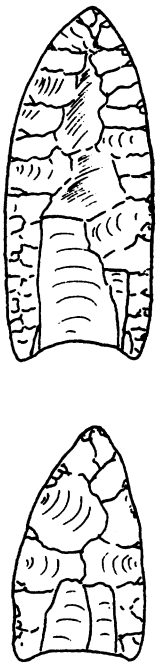
Perched on an outcrop of sandstone over Cross Creek, a tributary of the Ohio River, this shelter was a popular camping spot for people exploring America's East Coast, says principal investigator James Adovasio, director of the Mercyhurst Archaeological Institute at Mercyhurst College in Erie, Pennsylvania. Meadowcroft, enclosed at the back, has a commanding view of the landscape, access to fresh water, a high roof that allows smoke to escape, a southern exposure for warmth, and a floor that stays dry all year, 15 meters above the nearby creek. And radiocarbon dates from the deepest occupation level are more than 19,000 years old—far older than the Clovis time barrier.

Adovasio, meticulous and feisty, claims he didn't go looking for an ancient site. He says he came to Meadowcroft in the early 1970s because it was a good place to train students. At first, says Adovasio, "I guessed human occupation might go back to 3500 or 4000 years BP." But the cultural debris went much deeper. Adovasio's team identified 11 floor layers, with clay and shale at the very base, 4.6 meters down. "Jim can be quite a taskmaster," says Meltzer, and indeed, the rock shelter's immaculate interior —now protected by a wooden structure and wired with floodlights—is dotted everywhere with labels.

In soil removed from the site, researchers found 20,000 stone flakes and objects, 150 fire pits, 21 refuse or storage pits, 1 million animal remains, and 1.4 million plant remains. By 1975, Adovasio's group had released a string of 17 radiocarbon dates associated with the materials; today, 52 dates have been published. Adovasio says they line up in elegant order, the oldest in sterile clay and shale at the bottom (31,000 years BP) and the youngest at the top (1000 years BP). There are only four "reversals" in the column, points where a piece of material has a date that's out of sequence with its location in the soil. All four such flip-flops have dates of less than 6000 years ago.

But as soon as the older dates were announced, Adovasio says, they drew a "barrage of criticism." No critic has been more persistent than Haynes. Today, after decades of trading salvos with Adovasio, Haynes and others still have reservations. They point out that Adovasio has not published a final site report laying out the stratigraphy, the precise source of each artifact, and the associated dates. Adovasio says that this formal tome is still in progress, but that he and his colleagues have already answered questions in "thousands of pages" in 85 reports.

As at Monte Verde, radiocarbon dates have been a focal point for criticism. Early on, Haynes and others suggested that the Meadowcroft samples might be contaminated with coal particles or dissolved carbon in groundwater, tipping the results toward older dates. The scenario is plausible, because the area was once strip-mined for coal. Noting that soluble carbons removed from a sample before testing were older than the residue itself, Haynes suggests they were carried in by water.



Clovis or "Clovis-lite"? Very ancient stone spearheads (*bottom*) resemble Clovis points, only simpler.

Adovasio responds angrily that the nearest coal seam is nearly a kilometer from the shelter and that every sample was checked for coal. Just two of 11 samples had unusually ancient soluble fractions of carbon, Adovasio says, calling it an anomaly. For 2 decades he has dismissed what he now calls "pathological" skepticism about the carbon dates, saying there's no sign of water intrusion. In 1999, he was vindicated by an independent investigator, geomorphologist Paul Goldberg of Boston University. After microscopically inspecting 25 samples from six layers at Meadowcroft, Goldberg and his colleague Trina Arpin concluded that "no signs of groundwater activity could be seen."

Haynes, nevertheless, continues to say that the best way to settle all this is to get carbon dates on a few remaining items: a nutshell and some seeds. Adovasio isn't interested. He says he informed Haynes in the taverna at the Monte Verde meeting 3 years ago: "I will never run another date you have asked me for, because, since 1974, we've addressed every criticism anyone has raised. I've spent half my life on this." To Adovasio, the case is closed.

Cactus Hill: Racing the bulldozer

While critics wait for Meadowcroft's site report, they can pore over another tome: a formal report published by the state of Virginia on a site called Cactus Hill, about 72 kilometers from Richmond. Cactus Hill is only the second major East Coast site whose pre-Clovis artifacts have been well documented and the only one for which a full site report is available. The report was written by lead investigator Joseph McAvoy and his wife, Lynn, who run a private consulting firm

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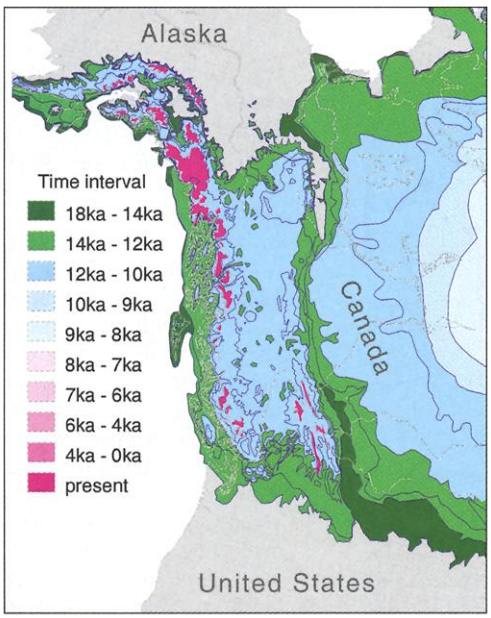
Clovis First

As some investigators struggle to prove the great antiquity of a smattering of archaeological sites in the Americas (see main text), they face a powerful and entrenched theory. For decades, archaeologists have agreed that the first to discover the Americas were the Clovis hunters, who crossed a land bridge from Siberia to Alaska and chased game south into the Great Plains. Before that, the theory goes, "there was nobody home" in either North or South America, as archaeologist Al Goodyear of the University of South Carolina, Columbia, puts it.

The timing of the Clovis people's journey is pinned down by the melting of the great glaciers of the last Ice Age. The Clovis people might have trekked through a gap in the glaciers just east of the ice-covered Pacific coastal mountains and south of the arctic ice, to the Great Plains (see map). But they couldn't have gone very far south before the ice melted to open a path. Carbon dating of plant material in the glacier's path indicates that the gap probably did not open earlier than 13,000 years before the present (BP), says Arthur Dyke, a glacier expert at the Geological Survey of Canada in Ottawa. By 12,000 years BP, the path clearly was open.



Skirting the ice. Clovis hunters must have arrived in North America after the ice melted on a path (light green) south from Alaska.

It is no coincidence, many archaeologists say, that widespread evidence of humans in the Americas appears just after this time. About 14,000 distinctive "fluted" stone points, typified by those found in Clovis, New Mexico, in 1932, have now been found at hundreds of sites across North America. The oldest are dated at 11,800 years BP, says C. Vance Haynes Jr., an expert at the University of Arizona, Tucson, who defined the Clovis culture. The Clovis imprint is so powerful that Haynes and many others insist that these hunters were the first people in the Americas.

Given the glacial obstacles, those arguing for pre-Clovis settlement must explain how such people arrived. They almost certainly could not have crossed the ice. Other theories hold that they might have traveled from Asia or even from Europe, moving from point to point along the coast in primitive boats (*Science*, 19 November 1999, p. 1467). Unfortunately, evidence of such a passage may now lie under water and at the moment offers little data to advance the pre-Clovis argument. **–E.M.**

called the Nottoway River Survey, with an appendix by a third investigator, Michael Johnson of the Archaeological Society of Virginia in Fairfax. The two teams maintain a competitive joint tenancy at the site without collaborating.

In 1989, McAvoy says, he learned about Cactus Hill from a farmer who noticed a fluted point in sand dumped on a roadway. In 1992, Johnson arrived, led by another amateur collector. Word got out. Often, says Johnson, "we have to run in front of bulldozers"—and in this case, he and the McAvoys also had to run after looters.

Cactus Hill, a gently sloping ridge 100 meters east of the Nottoway River, gets its name from the yellow-flowered prickly pear that covers it in summer. Windblown sand piled up at this spot over many millennia, according to McAvoy. This must have been a great camp, he says—high and dry, with a view toward the river and a now-vanished pond visited by waterfowl and deer. When archaeologists arrived in 1989, commercial sand haulers had done some damage. Prehistoric stone points were tumbling out of the side of the hill. Quarrying stopped, and the two teams began working at opposite ends of the ridge. In visits over the next few years, the McAvoys recovered 500,000 stone chips and more than 600 "diagnostic" artifacts that can be linked to specific cultures such as Clovis.

The hill yielded a mixed treasure. Near the top, excavators found traces of the British colonial period, including tobacco pipe stems, scissors, and a 1696 sixpence. At depth, they found layers containing projectile points of successively greater age, including some of the fluted Clovis type. At the lowest level just above sterile clay, they found a scraper, small stone blades, and a quartzite core from which blades were struck. Charcoal from this layer suggests its age is at least 15,000 years BP. In addition, the McAvoys found two unusual small stone points in a deep but undated layer, shaped in a style sometimes called "Clovis-lite." In the official 1997 report, McAvoy admits that these could be Clovis points that were whittled down by heavy use, but more plausibly, they are relics of a pre-Clovis culture. Johnson, for one, is adamant that they're old: "There's no way in hell these points are Clovis or post-Clovis," he says.

Reviewers who have visited the site are concerned mainly with validating the dates and sorting out the layers. Haynes, for example, worries that disruption by roots, animals, or looters could have pushed old charcoal into layers with young artifacts. And, because different samples from the same layer have been given different ages, he worries that researchers may be selecting favorable dates. McAvoy says that Haynes knows that the anomalous dates were from samples that outside experts, such as archaeobotanist Lucinda McWeeney of Yale University, judged to be intrusions of younger plants that burrowed down. There's no evidence that older material was pushed upward, McAvoy says.

Whatever the dates, Haynes is nevertheless impressed by the old points. He even offers a semantic concession, saying they could be "proto-Clovis artifacts" made by people who hadn't yet mastered the art of fluted points.

Similar tales of claim and criticism are playing out at other pre-Clovis sites. In Wisconsin, David Overstreet of Marquette University in Milwaukee aims to prove that stone tools and mammoth bones with cut marks are really as old as 13,500 years BP. Anna Roosevelt of the University of Illinois, Chicago, has been challenged on her reports of an 11,000-years-BP site at Monte Alegre in Brazil's Amazon. Jon Erlandson of the University of Oregon in Eugene is exploring artifacts in the 10,500-years-BP Daisy Cave on a channel island off the California coast.

Meanwhile, the McAvoys have already invested more time and money defending their dates and conducting new tests than they had ever imagined, says Joe McAvoy. And although he thinks that the antiquity of the site has been established, the effort has been stressful. If he were to do it all over again, he sometimes thinks, he wouldn't dig so deep. **–ELIOT MARSHALL**

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