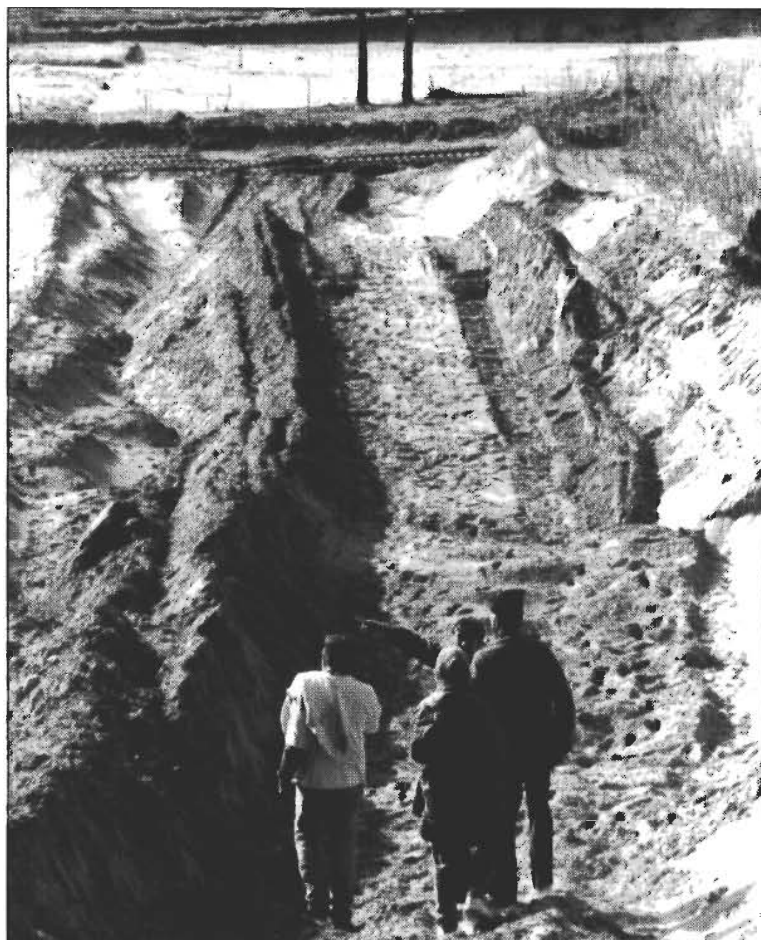




# MAMMOTH TRUMPET

Center for the Study of the First Americans  
355 Weniger Hall, Oregon State University  
Corvallis OR 97331-6510



ROBSON BONNICHSEN

## *New Dates for Old Site*

Touring the vast Diring Yuriak site in Siberia, visiting scientists view excavations conducted by archaeologist Yuri A. Mochanov as he followed a cultural layer on which ancient humans lived more than a quarter million years ago. The region's extreme cold implies the control of fire and the making of clothing, though direct evidence has yet to be found. Article begins on page 1.

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**T**he Center for the Study of the First Americans fosters research and public interest in the Peopling of the Americas. The **Center**, an integral part of **Oregon State University**, promotes interdisciplinary scholarly dialogue among physical, biological and social scientists. The **Mammoth Trumpet**, news magazine of the **Center**, seeks to involve you in the late Pleistocene by reporting on developments in all pertinent sciences.

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# MAMMOTH TRUMPET



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## THERMOLUMINESCENCE DATING PROVES EARLY PEOPLING OF SIBERIA

### Diring Site Confirmed More Than 250,000 Years Old

Painstaking research by a respected American prehistorian has affirmed that people lived in Siberia almost 10 times earlier than the commonly accepted time of 30,000 years ago. Michael Waters, geoarchaeologist at Texas A & M University, confirmed that the humans who left evidence of tool-making activities at the Diring Yuriak site on the Lena River 140 km from the city of Yakutsk endured the severe climate, probably at the end of a glacial period or early in an interglacial episode.

The Diring site was discovered in 1982 by Russian archaeologist Yuri A. Mochanov and his wife, Dr. Svetlana Fedoseeva, a distinguished archaeologist in her own right. Since then, Mochanov, Academician of the Russian Academy of Science, and director of the Lena River Basin Archaeological Expedition, has directed excavations at the site, which have revealed a number of pebble tools and lithic clusters around anvil stones. Geologists on Mochanov's team had dated this cultural horizon to between 1.8 to 3 million years. (**Mammoth Trumpet** 7:3 "Siberian Site Defies Theories on Peopling," and 9:2, "Mochanov Shows, Tells on U.S. Tour.") Though more recent, Dr. Waters's dates are scarcely less startling to anthropologists

studying the origin and dispersal of modern humans.

"What we found," Waters said in a recent telephone interview from his office in College Station, Texas, "is that the cultural horizon *has* to be greater than 250,000 years old." That date, he notes, places the tool-makers on the threshold of the evolution of modern humans—archaic *Homo sapiens*. Anthropologists have not known that any human ancestors lived in the far north, and Mochanov's suggestions that the rigors of Siberian climate prompted the evolution of modern humans have been largely ignored.

"Even if those people were up there during an interglacial," Waters said, "It was a very severe climate requiring fire, clothing, shelter and a sophisticated subsistence strategy to deal with the Siberian environment—to exploit it efficiently." He noted that Diring isn't an isolated site; Mochanov has now discovered more than a dozen other sites on the Lena with similar tools. They pose a number of challenging questions to prehistorians. How long was this occupation? When, specifically, did it occur? Were the people forced out by returning glacial conditions? Was there any human occupation after Diring but before the

*continued on page 19*

*Toolmakers on the  
threshold of the evolution  
of modern humans.*

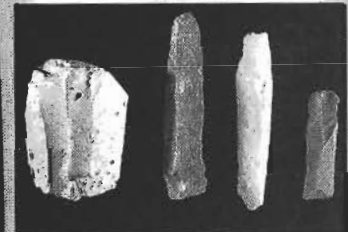
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# Board's Focus: Research and Fund Raising

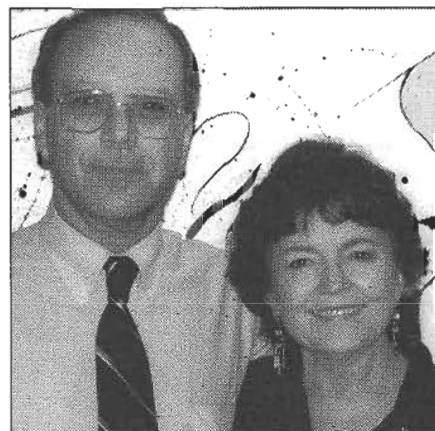
The CSFA Advisory Board recently met to hear about the progress of laboratory and field research, and to enjoy some artistic fund raising. The board also welcomed three new and returning members, and elected new leadership. Anne Stanaway of Boulder, Colo., and Alan L. Schneider of Portland, Ore., became co-chairs of the Board, and Gerry Fritts of Kirkland, Wash., became vice chair.

Director Robson Bonnicksen reported on recent field work at the Cremer site in central Montana and on developments at the Mammoth Meadow site in southwestern Montana. He said that because naturally shed human hair has been found not to be subject to repatriation under provisions of the Native American Graves Protection and Repatriation Act, the U.S. Bureau of Land Management has denied requests of two tribal groups for repatriation of hair. The Confederated Salish and Kootenai Tribes and the Shoshone-Bannock Tribes had requested repatriation of human hair that was found scattered throughout the Mammoth Meadow site's sediments. Though no human burials have been found at the Mammoth Meadow site, questions surrounding the tribes' repatriation request stopped field work at the site, which is near the continental divide southwest of Dillon. Bonnicksen and OSU officials have met with tribal representatives; Board members said they hope to involve tribes in continuing CSFA projects.

The new members are Tim Cahill, a Livingston, Mont., writer, and Henry Katz, a Simsbury, Conn., lawyer. Jo Ann Harris, a New York lawyer, was reinstated to the board after a 2-year absence while she served as head of the Criminal Division of the U.S. Justice Department. After their meeting at Oregon State

Harris, a New York lawyer, was reinstated to the board after a 2-year absence while she served as head of the Criminal Division of the U.S. Justice Department.

After their meeting at Oregon State



Alan L. Schneider and Anne Stanaway share leadership of the CSFA board.

## New from UBC Press

### Early Human Occupation in British Columbia

Edited by  
Roy Carlson and Luke Dalla Bona

In this book, 22 archaeologists present recent discoveries which document the existence of Native people in British Columbia during prehistoric times. Focusing on the first 5,000 years of prehistory, they show actual physical evidence of human occupation and discuss who these people were and what their way of life was like. 270 pages, 8½ x 11", illus., hc \$65.00

### Also available

### A Complex Culture of the British Columbia Plateau

Early Stl'atl'imx Resource Use  
Edited by Brian Hayden

584 pages, 6 x 9", illus., hc \$75.00

Order by phone: 604/822-5959  
FAX: 1-800-668-0821  
e-mail: orders@ubcpress.ubc.ca  
VISA and MasterCard accepted  
Shipping \$5.00

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Alice L. Hall	Office Manager
C & C Wordsmiths	Layout and Design

The Center for the Study of the First Americans is a non-profit organization. Subscription to the **Mammoth Trumpet** is by membership in the Center.

University, Board Members took part in a gala dinner/art auction at the Sherwood, Ore., home of Jean and Ray Auel. Titled "Art, Authors and Archaeology," the event was a benefit for the CSFA. Jean Auel is author of *The Clan of the Cave Bear* and the Earth Children series. Ray Auel's attire—dinner jacket and blue jeans—set the tone of the evening. More than 100 guests attended the event, which featured dozens of outstanding art works and raised money for CSFA research. Gerry Fritts and his wife, Rebecca, were in charge of arrangements for the gala, which was termed a spectacular success.

Authors and artists who took part included Stan Hunt, John Hoover, George Hunt Jr., Maximiliano Prudesá III, Dan Lomahaftewa, Catherine Dickson, Jennifer Holmes, Royal Nebeker, Frederick Hart, Martin Eichinger, D'Laird Glass Studio, Perry, Gabriel Winkler, Harry Oda and Miya Sanders. 



Guests at the Art, Authors and Archaeology event at the home of Jean and Ray Auel look over silent-auction items.


Proud supporters of new CSFA molecular archaeology laboratories at Oregon State University are Donald Gimbel, left, and C. Norman Winningstad. Their high bids at the Sept. 23 auction assured places for their names on two new labs.



## CRP 12 in Press; New Papers Welcome

If you're wondering whether reduced staffing at the CSFA office has delayed production of *Current Research in the Pleistocene* Vol. 12, the answer is a qualified "yes." Production of the 1995 issue of the Center's highly respected annual volume of research notes by Quaternary scientists was behind schedule, but all who have subscribed to Vol. 12 will be receiving it soon.

New procedures will assure more timely and efficient production of the 1996 issue and future volumes. And the call for papers for Vol. 13 is going out to scientists on our mailing list. If you would like to receive the call for papers and are not a contributor to Vols. 10, 11, or 12, please write to the CSFA and request a copy. Submissions for Vol. 13 must be received before March 15.

Vol. 12 of *Current Research in the Pleistocene* contains many significant contributions to archaeology, lithic studies, taphonomy, research methods, and paleoenvironments, plus a short section on the Native American Graves Protection and Repatriation Act of 1990. Of course it's not too late to order this important publication. Use the order blank on the wrapper of this issue of the *Mammoth Trumpet*. 



## The Public Trust and the First Americans

edited by Ruthann Knudson and Bennie C. Keel

The few remaining traces of the earliest Americans are rare, threatened by development, and prized by collectors. Once gone, they are gone forever; stewardship of these archaeological resources, with their information about our past environments, is a public responsibility. **The Public Trust** addresses the question of how we should manage these precious resources. 224 pages. Paperback. \$24.95 + \$4 shipping & handling.

Available from CSFA,  
355 Weniger Hall, OSU  
Corvallis, OR 97331

(Sorry, not available from our book distributor)

## Wormington Award Honors Two Families

The Center for the Study of the First Americans has honored two families with the H. Marie Wormington Award for contributions to First Americans studies. The annual awards are named for the late Dr. Wormington, a leader in the study of earliest American prehistory.

Geologists Mort D. Turner and Joanne C. Turner of Boulder, Colo., were cited for their role in getting the Center started. Joanne Turner was the principal architect for developing the Center's Advisory Board and is a charter member and secretary of the Board. Her husband, Mort, helped develop the Center's Scientific Council and to establish the center's publishing program.

Both Turners have been involved in the Center's research program, serving as co-investigators of the Mammoth Meadow site near Dillon, Mont.


Also honored was the Hall family of Corvallis, Ore. Roberta Hall, a professor of anthropology at Oregon State University, was instrumental in helping the Center move to OSU from the University of Maine in 1991. Her husband, Don, has



Mort and Joanne Turner, recipients of the 1995 H. Marie Wormington Award, are pictured during a brief break in field work at the Mammoth Meadow site.

served as editor of the **Mammoth Trumpet** since Oct. 1991. Late in 1994, their daughter, Alice, began helping revive the Center's membership data base, and was later named CSFA office manager. Alice works with the public, students and re-

searchers, OSU officials, OSU Foundation officials, and Board members, to help facilitate the Center's publications and research programs.

"Both families are absolutely essential to the success of the Center," said Director Robson Bonnicksen. "Without their help, the Center would be a very different organization." 


—Mark Floyd

## Nenana Field School Expedition Focuses on Paleoindian Research


The University of Alaska Fairbanks is organizing a field school expedition to the late-Pleistocene site of Moose Creek, Alaska. The expedition will be July 8 to Aug 16. The site is situated on a high bluff top overlooking the Nenana valley and was used as a lookout for game in prehistoric times, says Georges Pearson of the U of A Department of Anthropology. Pearson reports that Moose Creek has been dated to 11,730 years B.P., and belongs to the Nenana complex with other important early-human sites in Alaska such as Dry Creek, Walker Road and Broken Mammoth.

Pearson reports that students who attend will learn archaeological field and laboratory techniques. Classes will dis-

cuss Paleoindian archaeology, glacial geomorphology and lithic technology. Activities will include field trips to the University of Alaska Museum as well as to other Nenana complex sites, guest lectures, and a "hands on" lithic workshop.

Cost of the field school is the price of six academic credit hours plus \$400 to cover food and transportation. For more information contact: Georges A. Pearson, Department of Anthropology, University of Alaska-Fairbanks, P.O. Box 757720, Fairbanks, AK 99775-7720; phone 907-474-6756; e-mail [ftgap1@aurora.alaska.edu](mailto:ftgap1@aurora.alaska.edu). Or contact University of Alaska-Fairbanks Summer Sessions, P.O. Box 757540, Fairbanks, AK 99775-7540; phone 907-474-7021. 

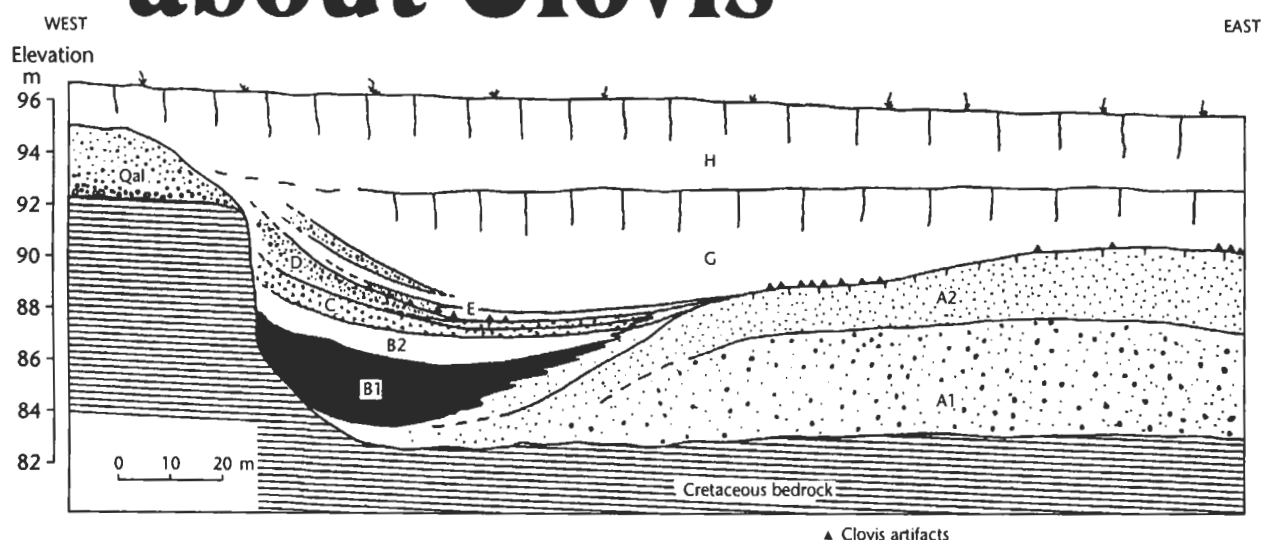
## Art Tour Scheduled To Caves of Spain

Archaeologist David Abrams and art historian Diane Kelly will lead a tour of Altamira and other prehistoric painted caves in Spain July 1-13. The tour, which starts and ends in Madrid, will feature prehistory, archaeology, cave art and art history. Destinations also include Castillo, Las Chimeneas, and Monedas caves and the Tito Bustillo site. For details of charges and schedule, contact Abrams of Past Times Archaeological Tours, 800 Larch Lane, Sacramento CA 95864; phone 916-485-8140; e-mail [dmabrams@ucdavis.edu](mailto:dmabrams@ucdavis.edu). 





# Good Luck and Careful Science Provide New Insights about Clovis



## *Aubrey Site a Deep, Undisturbed Camp*

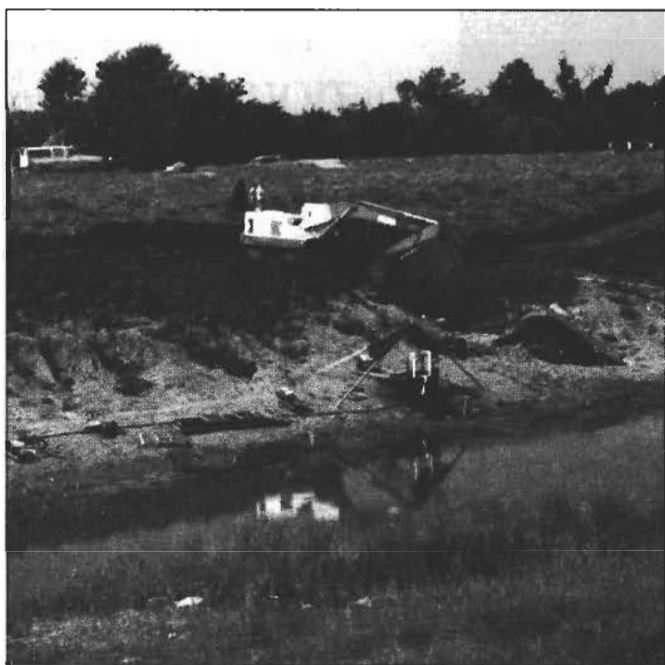
**W**HEN THE U.S. ARMY CORPS OF ENGINEERS created Lake Ray Roberts with a 2½-mile-long dam on the Elm Fork of the Trinity River north of Denton, Texas, they had to dig an artificial channel to connect the spillway to the natural river channel some distance downstream. As fortune would have it, the Corps had been contracting with C. Reid Ferring, an archaeologist with particular expertise in late-Quaternary geology of the upper Trinity basin. Dr. Ferring, of the Institute of Applied Sciences at the University of North Texas, recalls the December day in 1988 that resulted in discoveries that are providing better understanding of Clovis people.

"On a Saturday, almost literally on the last day of our field work, I took my son out to this channel because Cretaceous bedrock is exposed there and there are good fossils," Ferring

said in a recent telephone interview. His ulterior motive was to examine the Quaternary alluvium that lay above the bedrock. "I had deduced some years earlier that the Pleistocene-Holocene boundary should be very deeply buried below the floodplain," he said, but until the Corps cut the 35-foot-deep outlet channel through the thick alluvium, his deduction, which conflicted with previous geologic theory, could not be proved or disproved.

"When we walked down in there, the first things I found were bison bones, Pleistocene mollusks and lacustrine sediments." The hunt for Cretaceous fossils would wait. "I ran right back and called the Corps and said, 'I think we have some late-Pleistocene material in this, and it's full of fossils—we really should study it.'" Three days later Ferring and Corps officials walked into the channel excavation. "We found a Clovis point and five flakes."

Test excavations revealed more evidence of Clovis occupa-



C. REID FERRING

A backhoe digs overburden from the Aubrey Clovis site. Two thousand cubic meters of clay was removed to expose a camp buried 7 m below the Trinity River floodplain.

tion—in situ—under about seven meters of alluvium. “The more we tested, the more it became clear that we had a really complex occurrence, with multiple areas of activity.” What followed was a yearlong excavation with a full crew, with support from the Corps of Engineers.

Ferring seems to have been the perfect investigator for this Clovis discovery, termed the Aubrey site after the nearby town of about 1,100 residents. A Texas native, he had a doctorate in archaeology from Southern Methodist University in Dallas, about 50 miles to the south, with a dissertation on Old World lithic technology—upper-Paleolithic blades. He had done field work in Israel as well as in Texas. Soon after earning a Ph.D., he found he wanted to know much more about geology and started taking some classes. Two years ago he completed a second doctorate, having done a dissertation on late-Quaternary geology of the upper Trinity basin.

“So I spent years and years working within 50 miles of my house, and Aubrey is eight miles from my house.” The fortuity, Ferring agrees, is incredible. “It was really serendipitous that I found the Aubrey site, because that site had to be excavated geologically.”

His research has revealed that the Corps of Engineers had sliced across an extensive Clovis camp that lay beside a seasonal spring-fed pond, which had formed in a depression left where the river had run against a bluff of Cretaceous bedrock between 25,000 and 15,000 years ago. Some gradual filling of the pond had occurred before Clovis people camped beside it. Soon after Clovis time, deposition of alluvium became more rapid, eventually burying Pleistocene deposits under several meters of Holocene deposits. Had it not been for the construction of the artificial channel, the Clovis camp would have remained a secret of time.

“It was a spectacular chance for me to put all my training to work.” There were 11,000 lithic artifacts, mostly debris, but some revealed blade technology, the subject of Ferring’s first dissertation. The Aubrey blades were the first ones he had seen in the New World. Further, the site provided an excellent record of late-Quaternary environments, the subject of his second dissertation.

The channel excavation, of course, provided only a single transect through the site. That transect, however, eventually revealed four distinct areas of Clovis activity. There was the pond area with a bison-butchery area at its west edge, unmodified blades, and a feature Ferring believes was a well; east of the pond area was a camp with multiple-surface hearths, toolmaking and tool-sharpening debris, a lithic-processing area, an area where discarded tools were tossed, and faunal remains including bison, deer, turtles, fish and small game; and about 100 meters farther east, adjacent to the Clovis-age river channel, was an area that yielded four elephant ribs and evidence that biface and uniface lithic tools had been resharpened. Ferring has recently found a fourth cluster eroding out near the Clovis-age river channel still farther east.

There apparently was only one Clovis occupation, and because no later peoples occupied the site, there is no chance for confusion with younger archaeological materials; Ferring and his team have carefully analyzed Aubrey stratigraphy from the surface down through the Pleistocene sediments deposited on Cretaceous bedrock.

The Aubrey team excavated a 50-square-meter block in sediments where the pond had been and did limited excavations west of the pond. The investigators also examined a 115-square-meter block in the camp area east of the pond and a 65-square-meter block about 125 meters farther east beside what had been the river channel.

“When I found this site—once I realized exactly what it was—I was wondering if it was going to be really different—if I’d have something unique and spectacular.” Though there were no big surprises in the masses of archaeological and paleoenvironmental data, the scarcity of in-situ Clovis sites meant that all the information from Aubrey was valuable. “When we were all through and done, it turned out that the general quality of evidence for Clovis activities was the most outstanding aspect of the site,” Ferring told the **Mammoth Trumpet**.

“Any really well-preserved Clovis site is going to be significant,” he added. “We don’t have enough sites to identify redundancy very well.”

### Not a Short-term Tradition

Chronology of the Aubrey site has resulted in a significant lengthening of the generally accepted duration of Clovis culture. When analyzed by accelerator mass spectrometer, two samples of charcoal from the Clovis camp yielded ages of  $11,540 \pm 110$  (AA-5271) and  $11,590 \pm 90$  years before present. Those dates are causing some authorities to call Aubrey the oldest reliably dated Paleoindian site in North America. They prove that Clovis traditions persisted for at least 600 years, twice as long as many investigators had thought. At one time, some prehistorians suggested that Clovis was a brief, perhaps spas-

modic, tradition that quickly diversified into subsequent Paleoindian traditions. Now, Clovis must be seen as relatively stable over a long period, as well as over the continent.

Among American prehistorians with special interest in Aubrey is geoarchaeologist C. Vance Haynes, whose careful analysis of the Murray Springs site in Arizona placed Clovis occupation at about 10,900 years ago. "There are numerous interesting similarities between the technologies at Murray Springs and at Aubrey," said Ferring, "but they're separated by approximately 600 years." In a sense, data from Aubrey and Murray Springs complement each other. "Haynes's data are superb down at the kills where the animals were being butchered, but his camp was up on a stable surface and was never buried, so the camp isn't very well preserved," Ferring explained. At Aubrey, however, the best data are from the camp areas, and fewer data were available from the bison-butcher area on the west and little from what Ferring thinks may be a mammoth-butcher area on the east.

"I think that the real significance of Aubrey may come about as we find other sites and compare them with the really excellent record of Clovis occupation at Aubrey," he said. In a paper presented at the Society of American Archaeology annual meeting in 1995, Ferring stressed the importance of Aubrey's detailed paleoenvironmental record, which documents the climatic change at the Pleistocene-Holocene boundary. But investigators of Paleoindian sites probably are most fascinated by what Aubrey is revealing of Clovis mobility and lithic curation.

### Lithic Assemblage

What impresses Ferring about Aubrey's assemblage is that the tools are characterized by heavy usage. "They're not the complete points that somebody found on the surface, but the majority of the artifacts are resharpening flakes, and they're in nice little clusters where people resharpened things. You can see scraper resharpening pieces and biface resharpening pieces. They were using tools like crazy in this camp, but the number of

tools we recovered is very small." All matrix from the site was fine-screened.

Citing Bruce Bradley's analysis of Clovis lithic technology (see **Suggested Readings**) Ferring said, "Every single aspect of the technology he describes is at the Aubrey site. But it's the very last gasp of the life of a specific tool. Everything there is broken, discarded.

"We can find clusters of resharpening chips for scrapers, for example, that aren't there." The tools, he's sure, were taken away.

"Perhaps most striking is one cluster of about 2,000 biface-thinning flakes," Ferring continues, noting that the biface point itself is gone.

"And right next to the cluster is an abrader that has exactly the kind of polish and striations that Bruce Bradley, who has examined the assemblage, finds on his abraders that he uses to grind the bases of his points." What started as a big bifacial preform such as those widely known from the Anzick site, for example, was finished into a projectile at Aubrey, and everything remains but the point itself. "They selected flakes out of

that debris and made expedient tools out of them," Ferring explains.

Blade technology is represented by diverse blade blanks and blade tools. Though no evidence of on-site blade-core reduction was found, Ferring reports recovery of a chalcedony core tablet that suggests blade-core maintenance in another part of the site, unless the tablet had been brought in as an expedient tool blank.

"One of my favorite artifacts is an impact spall from the tip of a biface that we found next to one of the hearths," said Ferring. At first, it seemed puzzling because the material didn't match any other in the camp. Then, Haynes suggested a likely answer to this puzzle because of a discovery at Murray Springs: the piece had been brought to camp embedded in a piece of meat. Such a spall at Murray Springs Clovis camp was found to articulate perfectly with a point that had been recovered from the nearby kill area.

"We've really got kind of a Polaroid photograph of lithic technology of a Clovis camp—not a kill, or a quarry or a cache, but an in situ camp where *everything* appears to be related to final tool manufacture and tool maintenance." Ferring believes that picture is a significant contribution toward increased understanding of Clovis.

Aubrey is typical of Clovis sites in that the tool material all came from distant sources. Other than cobbles of Tertiary quartzites and petrified wood, Ferring says, there is no knappable raw material within almost 40 miles. The source of the nearest tool material at the site is about 200 miles away. "They were carrying stone from tremendous distances," says Ferring, but identifying exactly where it all came from is proving a challenge. "I'm like everyone else; I wanted to squeeze every single chip into an identifiable category, but I just can't do that," he explained after describing field trips to rock outcroppings on the High Plains near Lubbock and Amarillo, and to Louisiana.

Though he had originally thought the material all came from

*"It's a Clovis Occupation  
—in situ—under about  
7 meters of alluvium."*



Archaeologists from the University of North Texas excavate a camp area at the Aubrey site. They found multiple-surface hearths, clusters of burned and unburned bone, and about 7,500 lithic artifacts.

C. REID FERRING





the High Plains region, he is now pursuing the possibility that a considerable amount of it came from areas closer to the Gulf of Mexico. On a Friends-of-the-Pleistocene field trip in Louisiana two years ago, Ferring was shown quartzite and chalcidony that look identical to those at Aubrey. "So I've started trips down there to collect samples."

Ferring is planning to do petrographic analysis in hopes that microscopic examination of thin sections will help determine the source of the Aubrey material. "We may find more Gulf Coastal orientation to these people than we'd thought of previously," he said.

## At the Far Side of Possibility

Discovery of the Aubrey site illustrates the difficulty of finding new records of Clovis occupation. If it weren't for the construction of an artificial river channel through more than 25 feet of black Texas clay, it might never have been discovered—and as it is, much of the Clovis encampment may still lie buried beyond the bounds of the U.S. Army Corps of Engineers project.

"The invisibility of Clovis sites in this region now is less of a surprise than it was," says C. Reid Ferring, principal investigator of the Aubrey site. "Now people are saying we don't know how many Clovis sites are out there. Traditional survey methods can never find them."

Might core-drilling be the answer? Perhaps not. Ferring, who holds doctorates in both geology and archaeology, carefully studied logs of the Corps' bore holes in the channel site, but these did not even provide clues to the existence of the Clovis-age pond or the spring. "The big question, of course, is how large is that site?" he said.

"I drilled bore holes all around the site area—40- to 50-foot-deep bore holes." The cores enabled Ferring to determine that the pond was about a quarter of a mile long, and allowed him to map the land area between the pond and the river channel that had been the site of the Clovis camp. But the cores revealed nothing of the occupation.

"Subsurface detection of these kinds of things is going to be really difficult, to say the least," Ferring said. Discovery of Aubrey, he says, should serve to remind us that maps of the continent that indicate where Clovis points have been found "are terrible indicators of where we might expect to find Clovis sites."

The very geologic processes that preserve signs of early human occupation by burying them under sediments are likely to cover them so deeply they might never be found. Clovis-age occupations, of course, will necessarily occur on surfaces created at the end of the Pleistocene, and though sediments marking the Pleistocene-Holocene boundary are about 30 feet deep in the Aubrey area, that boundary lies under 50 to 60 feet of alluvium farther down the Trinity River in the Dallas area.

Aubrey is considered the easternmost of "Western" Clovis sites, but perhaps a continuum of such camps, hidden under Holocene deposits, is spread across the continent.

## Fauna and Subsistence

After returning from field work in the Caucasus last summer, Ferring went to inspect the Aubrey site, where flooding had caused some erosion. Downstream from where the elephant ribs had been recovered, he discovered a new clue to the activities of the Clovis people. "I found a mammoth metacarpal," he said. "It was on the surface, not in situ, but most probably it eroded from the area where we found the ribs."

At the time of that original find, alongside the river's paleo-channel about 100 meters east where the crew was working in the big excavation at the camp site, Ferring discovered a bit of lithic debris. "I found another cluster of chips, just six or seven chips on the surface," he recalled. "So we put some test pits in, and sure enough there was another cluster of about 3,500 artifacts." The raw materials were the same as those being found in the camp, but the tools and debitage patterns were different. There was a big cluster of 1,500 resharpening flakes all in one pile. "I knew somebody had sat down there to resharpen bifaces. The question was, why right there? There was hardly any fauna in this part of the site."

The first clue to the puzzle came after the Corps of Engineers released a flow of water. "As soon as we could get back in there, here were these ribs coming out about four meters from where the lithics were found." It was impossible to investigate the paleo-channel area, but his recent discovery of the mammoth bone makes Ferring suspect that the people had butchered a mammoth down there. "They climbed up that slope to resharpen their bifaces while they butchered," he theorizes.

West of the Clovis-time pond is where the team found bison remains—a cow and a calf in association with blade tools. Though the team could find no cut marks on the bison bones, a humerus had been split open, apparently by a hammer-and-anvil technique. Many of the faunal remains associated with the Clovis-age lithics do not bear direct evidence of butchering. Overall, the team recovered more than 15,000 faunal remains associated with five particular areas of the site.

Turtle and large-mammal remains are the most common categories. Turtle remains, found in clusters, constituted most of the burned bone recovered. In addition to bison and mammoth, deer and likely other large mammals probably were utilized. However, Ferring believes the evidence indicates people carried meat into camp from procurement areas beyond the site.

Many small mammals, including rabbits, lemmings and muskrats, were identified, as well as fish and birds. "Foraging was apparently a component of the overall resource procurement system," Ferring reports, suggesting Clovis people operated much like later occupants of the region.

What brought the Clovis people to the spot that the Corps of Engineers' channel uncovered thousands of years later? Was it because they chanced to find large game there, or did they camp between pond and river because it seemed ideal quarters for an interval in their nomadic lives? Or were Clovis people so abundant that almost any deeply buried, 11,000-year-old stratum hold their cultural remains? Aubrey has added to the knowledge of the Clovis tradition, but big questions remain to be answered.

Ferring believes Aubrey represents more than a chance



C. REID FERRING

The Aubrey Clovis site extends along an artificial river channel. The nearest canopy, right, covers excavations along a Clovis-age pond where bison bones and blades were found; the center canopy covers a camp area; canopy in left distance covers a possible mammoth butchery area.


encounter with prey species. People who carried valuable tool-grade stone to be used as knives and weapons hundreds of miles from its source surely carried food with them as they moved. "I find it impossible to believe that any culture that evolved out of hundreds of thousands of years of meat eaters didn't figure out how to dry meat," he said. Noting that people tend to think of Clovis people killing an elephant and staying there until they consumed the animal, he continued: "I think we could easily expect them to do what Plains people did later—they would dry the meat and then carry it with them—weeks' of supplies of food. But we can only speculate on that."

He believes it is quite possible that Clovis people foraged for diverse game, such as turtles and small mammals, while processing large animals such as bison and mammoths. The large-game component of the Aubrey site may represent a food bank for the next move.

Besides knapping stone that had come from afar, and processing and cooking food, the Aubrey inhabitants seem to have made at least one alteration to the 11,500-year-old valley. On the surface that had sloped toward the west side of the pond is a feature Ferring believes was a well. Possibly it provided water when the pond was dry, for by Clovis time the pond existed only

seasonally or periodically. A spring that had fed the pond, which his stratigraphic records indicate had been collecting sediments for about 3,000 years, became merely a seep by Clovis time.

As an in situ Clovis habitation, Aubrey is an exciting discovery, but the environmental record revealed by the investigation may be even more significant. "We have pollen, snails, insects, vertebrates and sedimentary-geochemical data," says Ferring. The data suggest that the area was a cool prairie environment in the late Pleistocene before Clovis occupation. River flooding began burying the Clovis surface soon afterward and, with one obvious interruption, continued for about 10,000 years. Early-Holocene climate seems to have shifted toward drier conditions that climaxed in a dry period 5,000 or 6,000 years ago.

Though his combined expertise allowed Ferring to do both geology and archaeology at Aubrey, he relied on a multi-disciplinary team. Its members and their specialties include Herbert Haas, radiocarbon dating; Scott Elias, entomology; Ernest Lundelius and Bonnie Yates, vertebrate paleontology; Raymond Neck, malacology; John Humphrey, stable isotopes; and Bonnie Yates and Pegi Jodry, taphonomy. Support for the work came from Corps of Engineers, Fort Worth District. 

—Don Alan Hall



C. REID FERRING

Excavations in this part of the site yielded elephant ribs near a concentration of about 3,500 lithic artifacts—mostly debris from biface resharpening. Archaeological screens are reflected in water of the artificial river channel.

# Site near Savannah River Yields Clues to Paleoindians

A deeply stratified site near the Savannah River in South Carolina is yielding rare clues to technologies in use at the beginning of the Holocene. Paleoindians and people of later times quarried a high-quality chert there, and left behind many spear points, preforms, and fragments that archaeologists have discovered.

The South Carolina Institute of Archaeology and Anthropology at the University of South Carolina concluded a productive, month-long excavation at the Big Pine Tree site on Smith Lake Creek last June. Known since 1983, the site is part of the Allendale Chert Quarries, a district on the National Register of Historic Places. Quarry sources in the creek bed were discovered during underwater archaeological explorations by the Institute in 1985 as part of an evaluation of the Paleoindian occupations of Smith Lake Creek. Prior to the 1995 excavation, the Big Pine Tree site was extensively tested with backhoe trenches and hand-dug test units. Methods from geology and soil science were employed in the investigation.

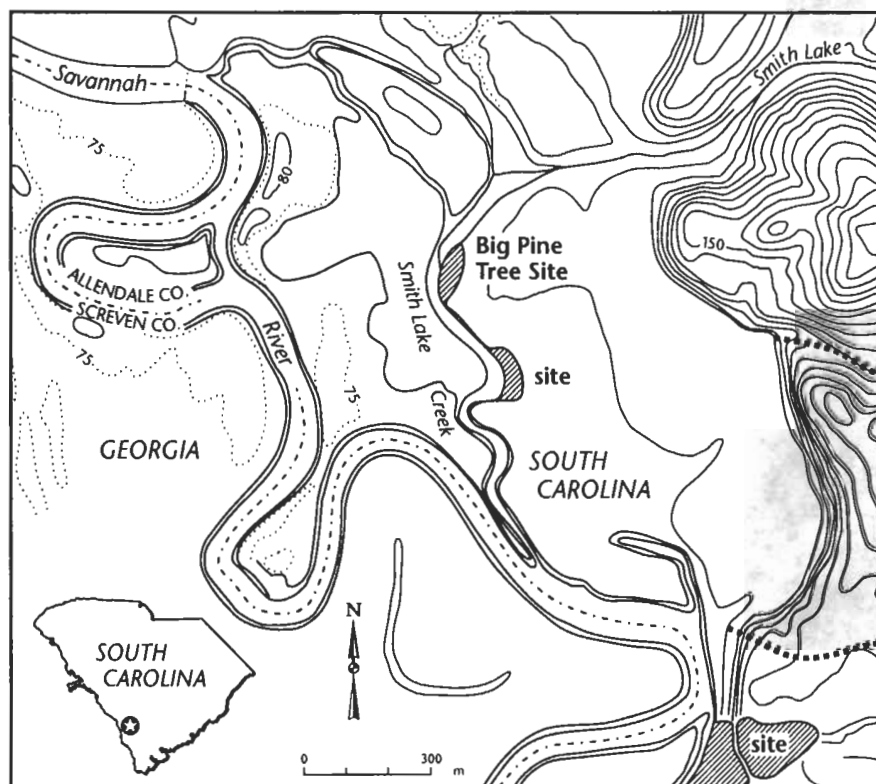
Albert C. Goodyear, associate director of research at the S.C. Institute of Archaeology and Anthropology and leader of the Allendale Paleoindian Expedition, is enthusiastic about the Big Pine Tree site and the discoveries his team has made there. Beneath an extensive midden dating to late-Archaic time, 5,000 to 4,500 years ago, the Paleoindian level is found from 115 to 135 centimeters below the surface. Dr. Goodyear reports that his team has discovered nearly a dozen well-fluted biface blanks and preforms in the Paleoindian level. The emphasis on early-stage percussion basal thinning resulted in a massive flute scar that presently is interpreted as Clovis or Clovis-related. No finished fluted points made from chert have been excavated, although a fluted point made from quartz crystal was

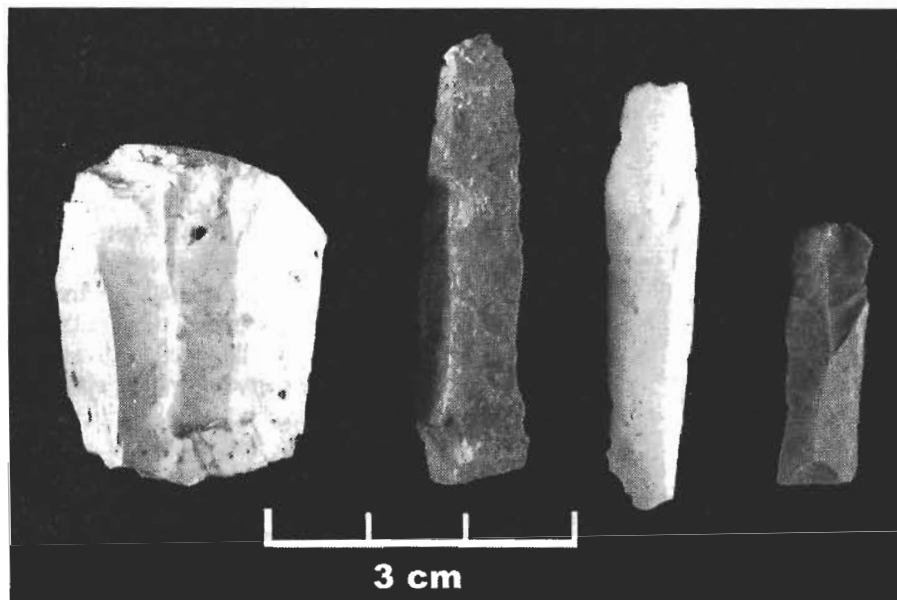
found in the creek from underwater operations in 1995.

The strong pattern of early stage percussion fluting suggests, Goodyear says, "that a major flute flake was not the last flake removed from some of the points, as is conventionally thought." A cursory examination of fluted points from the South Carolina area that exhibit a major flute

scar indicates that the flute had to have come from the biface when it was in an earlier (larger) stage. Because of its many broken preforms in various stages of reduction, the Big Pine Tree site holds the promise of helping archaeologists unravel some of the mysteries concerning how Paleoindian people produced their finely crafted spear points.

## Microblades Surprise South Carolina Team





DARYL MILLER

A microblade core and microblades from the Big Pine Tree site.

Artifacts associated with the Paleoindian level include many well-made unifacial flake tools such as endscrapers, sidescrapers, graters, retouched flakes, and prismatic blades and cores. The prismatic blades are small, less than 8 cm in length, and Goodyear describes them as "delicately thin," suggesting they could be preparations for microblades. Some of the blades and microcores indicate they were thermally altered, probably to assist removal of blades by pressure flaking.

The presence of Clovis-age thermally altered microblades in the Southeast is a remarkable new discovery, says Goodyear. Based on the presence of customary Paleoindian flake tools, it is clear that early people were using the site for more than just chert processing.

"Feature-like concentrations of artifacts occur, some bearing witness to behaviorally specific events such as biface manufacture, core reduction and scraper using," says Goodyear. The brown, water-smoothed cortex of the flakes indicates that makers of the tools were getting most of their chert from the quarry now at the bottom of Smith Lake Creek. The Paleoindians, says Goodyear, no doubt had first access to the high-quality Allendale chert. "The spatial integrity of the Paleoindian level is really remarkable given that floods no doubt repeatedly passed over the terrace top," he added.

The scientific team investigating the Big Pine Tree site includes soil scientist

John E. Foss, chair of the Plant and Soil Science Department of the University of Tennessee. Dr. Foss has classified the site's various sediments and paleosols based on morphology and lab study. Almost a meter and a half of alluvium from the Savannah River has accumulated at the site during the 11,000 years of human occupation. The Paleoindian artifacts came from sands deposited by the first floods of the Holocene; 10 or 20 cm below the Paleoindian level is a terrace deposited during the late Pleistocene.



NENA POWELL RICE

Albert C. Goodyear, associate director of research at the S.C. Institute of Archaeology and Anthropology, points out artifacts at the contact marking the Pleistocene-Holocene transition. He is in a backhoe trench at the Big Pine Tree site.

Age of the oldest occupation in radiocarbon years remains to be determined. Goodyear said that four small lumps of charcoal associated with the fluted-point layer should answer the question, but because of their small size, radiocarbon dating will need to be done by accelerator mass spectrometry, which costs \$560 a sample. Grant funds are being sought for the dating.

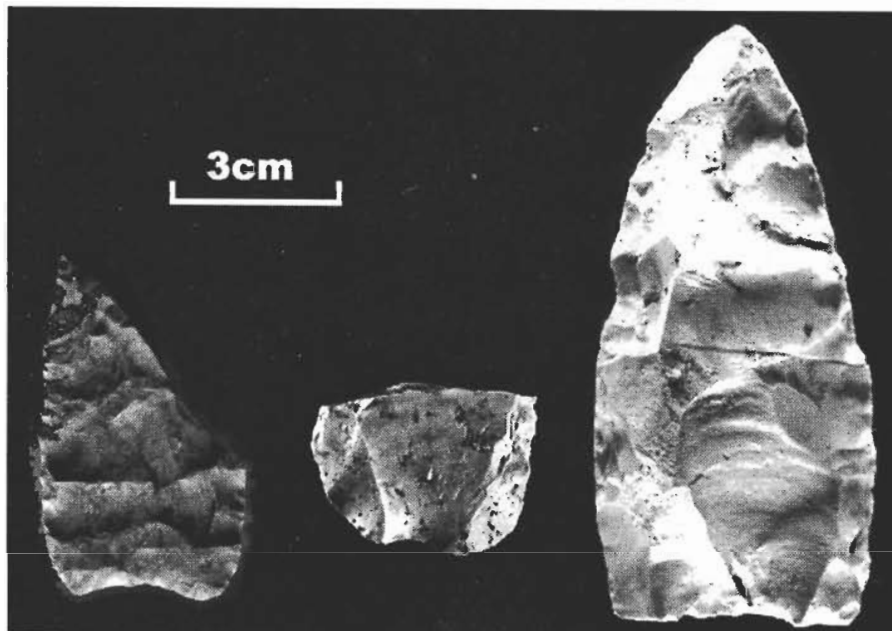
More than 50 square meters has been excavated to the site's Paleoindian level. From the surface to about 15 cm are light red sediments, the results of 19th- and 20th-century floods that carried red clay from poorly managed farmland on the Georgia and South Carolina Piedmont. Below that, down to 60 cm, are sediments and a single paleosol containing traces of Woodland people dating from A.D. 1400 to 3,000 years ago. Refuge Simple Stamped sherds and triangular arrow-

### *Finding Clovis-age heat-treated microblades in the Southeast is a remarkable discovery.*

heads—artifacts that should date from 2,000 to 3,000 B.P.—dominate this zone.


From 60 to 90 cm, the site contains a





Fluted lanceolate preforms from the Big Pine Tree site in Allendale County, S.C.

land surfaces in ways that enhanced their contextual preservation." However, he considers floodplains a prime place to search for buried sites, and he and Foss have been exploring bottomlands in the Mid-Atlantic region. They are interested in documenting the Pleistocene-Holocene transition in the alluvial setting as a means of recognizing possible buried Paleoindian site situations. The archaeological and geological context at the Big Pine Tree site would appear to give a clear stratigraphic picture of the Pleistocene-Holocene transition.

The ultimate goals of studying a Paleoindian chert quarry are to link the data with what is known about distribution of early lanceolate points and sites found throughout the Mid-Atlantic region, and to formulate models of settlement systems. A survey under way since 1968 has recorded nearly 400 Paleoindian lanceolate points from throughout South Carolina; a large percentage are of the Clovis type made from Allendale-type chert. "We know they returned periodically to these chert quarries to replenish their tool kits," Goodyear notes. "Paleoindian lanceolates made from Allendale-type chert show up over 100 miles away. That tells us that the chert quarries were part of a really vast settlement territory occupied by these first Americans." 

preceramic midden of late middle-Archaic age that includes high concentration of organic matter and burned fragments of wood and nutshells. Gail Wagner, University of South Carolina ethnobotanist, has advised and aided in the collection of soil samples for flotation analysis. Dr. Wagner's graduate student, Myles Bland, is analyzing charred botanical remains from late-Archaic hearth features that have intruded into the Middle Archaic midden.

The stratum at 90–100 cm is considered a transitional zone that has yielded projectile points that span a 2,500-year period. Foss's analysis of the soils indicates it represents a time when the Savannah River was not flooding as much as in earlier and later times. From 100 cm down to the Paleoindian level at 115 cm is an early-Archaic level typified by the presence of Taylor side-notched points.

The South Carolina Institute of Archaeology and Anthropology has been studying the Allendale Chert Quarries for more than 10 years. The land is owned by Clariant, which recently purchased it from Sandoz Chemical Corp. Both Sandoz and Clariant officials, Goodyear said, "are to be commended for their interest in preserving and studying South Carolina's archaeological heritage." Besides providing the crew with camping space, including installation of electricity for the camp kitchen, they have donated backhoe work

for moving back dirt and backfilling the excavation.

Paleoindian sites are rare in South Carolina and throughout the South. Goodyear notes that Paleoindian studies have lagged in the Southeast as a result. "It seems that in the Southeast at the end of the Ice Age, climatological and geological conditions were not generally conducive for burying these early sites on most

## Calling Volunteers

The Allendale Paleoindian Expedition is scheduled to go into the field for a month from May 7 through June 1, 1996. Expedition leader Albert C. Goodyear says the 1996 field season will be funded in part by interested members of the public who wish to register for a five-day experience. Twenty slots are available for volunteers, whose fee is \$275 for the week. Participants will help in all aspects of the excavation and lab analysis. Evening lectures on the archaeology of the Savannah River Valley and South Carolina will be provided by staff archaeologists and visiting scientists. Free camping with hot showers and a kitchen is available

near the site at a recreation center. Lunch and supper will be provided, and a cook will prepare the evening meal. Motels are available within 25 minutes of the site for those who do not wish to camp. The first week will be May 7–11; the last, May 28–June 1. Application materials will be sent upon request; applications must include a \$35 nonrefundable application fee, with the balance due on or before March 1. Those interested in participating should contact Dr. Goodyear at the South Carolina Institute of Archaeology and Anthropology, 1321 Pendleton Street, USC, Columbia, SC 29208; phone 803-777-8170.





**D**ETERIORATION due to natural and man-made causes is affecting many rock-art sites in the United States today. Natural causes include erosion caused by weathering, various geological factors, and drainage problems. Biological factors include the growth of lichens and mosses and other living material on the rock surface.

Their visibility leaves rock-art sites vulnerable to vandalism or to damage by well-meaning but uninformed admirers. Damage may take the form of graffiti rendered in spray paint, charcoal, or pencil, or perhaps incised into the rock face with another rock. Chalking done to enhance the viewing of petroglyphs can lead to chemical deterioration. There are also cases of well-meaning "vigilantes" who try to clean away graffiti, but instead inflict more damage by employing inappropriate methods. The impact of a large number of visitors is also a concern at some of the more popular sites.

As one of only a handful of professionally trained archaeological conservators working in the United States today, J. Claire Dean spends about 80 percent of her time working on rock-art conservation; she spends the other 20 percent on the care of archaeological materials in the field.

Dean knew as early as age six that she wanted to be an archaeologist, and by age 13 was already excavating sites with an archaeologist who became her mentor. Dean has a bachelor of arts with honors in archaeology from the University of Leicester and a graduate degree in archaeological conservation from the University of Durham in England.

She has worked on prehistoric sites in Europe, Cyprus, and Turkey, and she believes that her training and experience in the field have helped to make her a more effective conservator because she understands how archaeologists work and think.

Since moving to the United States in 1986, Dean has gradually found herself working as a conservator on more and more rock-art sites because there is such

a demand for her expertise. Though she spends most of her time working under contract for federal agencies such as the National Park Service, Bureau of Land Management, Forest Service, and the Bureau of Reclamation, she is also often

conservation has not received the emphasis that it has in countries where universities offer specialized training in archaeological conservation. In Australia, the aboriginal population has been politically active concerning land-rights issues that

involve many of their rock-art sites. "Many of their sites have been in continual use for tens of thousands of years," she said, noting that in the U.S. the continuity has been disrupted to a certain extent.

Native peoples in the U.S. don't use the sites the

## An Archaeological Conservator Looks at the Conservation of Rock Art

hired by state and local governments, and sometimes by tribal groups or private individuals.

How does Dean characterize the current state of rock-art conservation in the United States?

It's improving, she said in a recent telephone interview, but it has a long way to go. "We're way behind, I'm sorry to say," she told the *Mammoth Trumpet*. "Canada has done more scientific conservation with regard to rock art than we have here in the U.S." She also sees Australia and France as being far ahead of America in conserving rock art.

Dean suggests a number of reasons why the U.S. effort is lagging. For one, art and archaeology has not been geared towards it because until recently there has not been a real demand for the conservation of rock art. Education is another factor. There are about half a dozen art-conservator training programs at North American universities, and none emphasizes archaeological conservation. All draw their students primarily from fine arts and art history, and thus rock-art

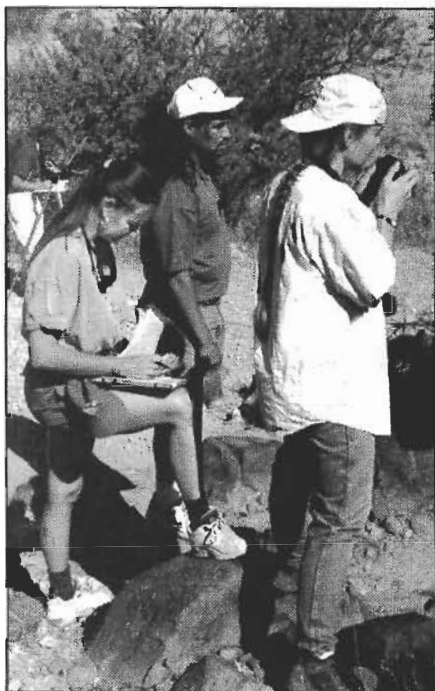
way they used to partly because they had been prohibited from practicing their religion. However, she notes that Native American communities are becoming more involved with their cultural heritage and their heightened interest has resulted in demands for cultural resource management.

The general public has also grown more interested in rock art.

Why haven't archaeologists shown more interest in rock art?

"Archaeologists like to be able to date things," says Dean. "If we can't date things, then we have less of an interest in them, and we haven't been able to date rock art. It's been the poor sister in archaeology—that is, until recently, when we've begun to develop dating methods."

When called to a site by a government agency, Dean is often asked to do an assessment of the condition of the site and then she is expected to provide recommendations as to how it should be managed. In another common situation, she is asked to do an evaluation of a site that has experienced damage or theft.



PHOTOS: J. CLARE DEAN

Workshop participants assess the condition of rock art and record it photographically. At this recent session, within the boundary of Lake Mead National Recreation Area, the hosts and sponsors were the U.S. Bureau of Reclamation and National Park Service.

Such an evaluation usually is in connection with possible prosecution under the federal Archaeological Resources Protection Act. A lesser portion of her time is spent in the actual removal of damage perpetrated by vandals and in solving various site-deterioration problems.

She said that she is increasingly called upon to provide treatment for sites on which she had previously done condition assessments, and she encourages that order of business. "We have to know what the problem is before we can do anything about it." She finds that most resource managers want to proceed carefully and do the right thing when it comes to treatment of sites.

Recognizing the obvious need for proper training in rock-art site management for cultural resource managers and others, Dean and fellow archaeologist Larry Loendorf have recently begun holding rock-art workshops on conservation and documentation. They also offered a month-long rock-art field school in 1994 for students in anthropology, conservation, art and related subjects.

One of their recent one-week workshops was for federal employees and Native Americans involved in cultural-resource management. The goal, from the conservation perspective, was to make them more aware of the processes of deterioration within rock-art sites, and how

to recognize these processes so that they know what to be concerned about and what not to be concerned about.

In workshops and field schools, Dean and Loendorf cover appropriate techniques for recording, describing and dating rock art. They also focus on site-protection techniques, management programs and general site conservation,

***Vandalism is such a big problem that there aren't enough conservators.***

and they address various vandalism removal and reduction techniques.

Vandalism and theft are very common problems at many U.S. rock-art sites that are open to the public, says Dean, so she presents resource managers with various methods for removing graffiti. She stresses that she would never recommend that they try to clean up graffiti that occur directly over or in close association with a piece of rock art. Such work should be left to a professional conservator because there is too great a risk of permanently damaging the site.

Dean says vandalism is such a big problem that there aren't enough people

like her around, nor is there the funding to have someone like her come in and clean away graffiti. "My personal approach to this is that there are methods that are available for land managers to use under the appropriate supervision," she says, but they should only attempt to clean areas that are peripheral to the rock art itself.

Dean advocates a multistep procedure for site managers to follow: first, consult with local Native Americans; then you document the site; next, you do research to find the best removal product to use; then, you check the chemistry of the product and see how that relates to the chemistry of the parent rock that you are about to apply it to, making sure that there is no potential for adverse reaction between them; next, you do a controlled application test; finally, you remove it correctly, monitor the site and document everything you did.

She does not use any of the many products that are specifically made to remove graffiti from concrete and other surfaces. To remove spray paint, for example, she prefers to use commonly available materials that can be used with care.

"I'm looking for methods that are cheap and easy and safe," she says, adding that many people she deals with may not be sufficiently familiar with the chemicals to use them without putting them-

selves at risk. However, with proper training and guidance, Dean believes that there are things that site managers can do that will result in safety for themselves and the site.

"I'm actively working to find methods that do not involve chemicals." She is doing this not only for her own personal safety but for practical reasons. Out in the field there is no easy access to fume-extraction units or to hospitals. Moreover, the use of some of these chemicals can put the environment and nearby archaeological sites at risk. "Most rock-art sites are adjacent to potential archaeological deposits such as cave floors or the floors of rockshelters. You don't want to contaminate those." Further, many Native Americans object to the use of chemicals at rock-art sites, believing that it is not appropriate to the spiritual integrity of the site.

Dean makes it a point to consult with Native Americans and to comply with their wishes. She views this consultation as a sign of respect and just plain good manners.

## COMING CONFERENCES

**March 13-16 49th Annual Northwest Anthropological Conference, University of Idaho, Moscow.**

Contact: Sociology-Anthropology Dept., University of Idaho, Moscow, ID 83844-1110. 208-885-6751.

**March 21-24 Central States Anthropological Society 71st Annual Meeting, Cincinnati.**

Contact: James F. Hopgood, Anthropology Program, Northern Kentucky U, Highland Heights, KY 41099-2200. 606-572-5259; FAX 606-752-5566; hopgood@knu.edu.

**March 27-30 Society of Ethnobiology's 19th Annual Conference, Santa Barbara.**

Contact: Jan Timbrook, Department of Anthropology, Santa Barbara Museum of Natural History, 2559 Puesta del Sol Rd. Santa Barbara CA 93105. 805-682-4711 ext. 307; FAX 805-569-3170.

**April 10-14 Society for American Archaeology's 61th Annual Meeting, New Orleans.**

Contact: SAA, 900 Second St. NE #12, Washington DC 20002.


**April 11-13 American Association of Physical Anthropologists 65th Annual Meeting, Durham, NC.**

Contact: Matt Cartmill, Duke U. Med. Center, Durham, NC 27710; 919-684-8034; Matt\_cartmill@whistle.cellbio.duke.edu.

**May 20-24 International Symposium on Archaeometry, Urbana-Champaign.**

Contact: Sarah Wiseman, ATAM Program, University of Illinois, 116 Observatory, 901 S. Mathews, Urbana, IL 61801. 217-333-6629; FAX 217-244-0466; wisarc@ux1.cso.uiuc.edu.


**May 24-26 Third Eastern States Rock Art Conference, University of Maine at Machias.**

Contact: Mark Hedden, Maine Historic Preservation Commission, 55 Capitol St., Augusta ME 04333. 

Hundreds of rock-art sites in the U.S. are open to the public and yet have never been adequately recorded. At their workshops, Dean and Loendorf emphasize the need to properly record all rock-art sites. To successfully prosecute a theft or vandalism case in a court of law it is essential to prove the existence and physical condition of the site prior to the incident.

Visitor impact is another factor that requires proper documentation. "In order for us to gauge the impact of large numbers of visitors on a site, we need to know what the condition was at a given point in time," says Dean, and then be able to look at it again at some point in the future and compare.

The **Mammoth Trumpet** asked Dean how those charged with the responsibility for protecting and conserving rock-art sites can obtain information when they have a question about how to proceed in a particular situation.


The first place to start, she suggested, is to call various colleagues who may have had similar problems. "One of the first places I would call is Petroglyph National Monument in Albuquerque, N.M. This is the only national park in the country that is dedicated to the preservation of petroglyphs." Another good source of information is the Deer Valley Rock Art Center near Phoenix, Ariz., which is becoming another center for rock-art research. And on the Internet, one can join a newsgroup on rock art by sending a message to [listserv@asuvm.inre.asu.edu](mailto:listserv@asuvm.inre.asu.edu) and in the body of the message type: `sub rock-art [your name]`. 

—Carol Ann Lysek

## Scientist Seeks Woolly Mammoths For Dating Study

When did the woolly mammoth become extinct? Was there a pattern to the extinction of the great animals that grace this publication's logo?

A new study is trying to answer those questions by dating more than 200 woolly mammoths from Alaska, across Canada, along the ice-free corridor, and into mid-America. R. Dale Guthrie, organizer of the project, is looking for additional mammoths to date. Dr. Guthrie says his samples from interior Alaska and the Yukon Territory are more than adequate, but he still needs woolly mammoth fossils from northern and western Alaska, other parts of Canada, and from Wyoming east through the Midwestern states.

The National Science Foundation is sponsoring radiocarbon dating by accelerator mass spectrometry. Any museum with such specimens can get free dates and at the same time can greatly assist in the research. Guthrie prefers molar roots—particularly third molars; he needs 4 to 6 grams of material. Readers may contact him for details by phoning 907-479-6034 or writing him at the Institute of Arctic Biology, University of Alaska, Fairbanks AK 99775. 



# ISN'T SCIENCE FUN?



©ZiNj EDUCATION PROJECT

## MAGAZINE INVOLVES KIDS IN THE EXCITEMENT OF DISCOVERY

**M**OST KIDS LOVE DINOSAURS, and they also seem to love *ZiNj*, a new educational magazine for youngsters that takes a lively look at dinosaurs, fossils, and prehistory. Its goal is to make the past meaningful to kids through stories and themes that they find interesting.

Its hero-sized format (11 by 17 inches) and wide variety of frolicsome typefaces used in conjunction with colorful and playful graphics have gained this new publication a growing audience as well as national awards. In 1994 it won the national Parents' Choice Honor Award and a national ADDY, an award for design from the American Advertising Federation. Its first issue appeared in 1993; the fourth one just recently came out.

The 16-page, full-color magazine is aimed at "kids seven to 14, plus or minus 80," says *ZiNj* editor Kevin Jones.

The scientific material is presented in such an entertaining and informative manner that many parents readily admit to reading it along with their children. Dr. Jones, who is the Utah State Archaeologist, described the *ZiNj* project in a recent telephone interview. He says the magazine supports active learning, and he hopes to demonstrate to kids that science is fun.

Jones says *ZiNj* tries to capitalize on kids' natural curiosity and enthusiasm. He believes that dinosaurs and evidence left by ancient humans spark the imagination and sense of

wonder of kids because they know prehistoric people and dinosaurs really existed. As editor, Jones takes guidance from the *ZiNj* advisory board, which consists of 32 kids from around the country who range in age from 7 to 14. They work in conjunction with an adult advisory board of 13 archaeologists, paleontologists, educators and historians.

The magazine especially tries to get across the idea that science is fun. Jones thinks that archaeologists and paleontologists have an edge when it comes to imparting the fun of science to kids because scientists attracted to these professions tend to be enthusiastic nonconformists that kids can relate to easily.

Kids particularly dislike being talked down to, says Jones, so the magazine makes a special effort to communicate in a voice that is by and for kids. This doesn't mean that big words are avoided, but it does mean that a sense of fun and a little silliness are the order of the day. To get a better idea how *ZiNj* connects with kids, the **Mammoth Trumpet** talked with Lydia Martinez, a 14-year-old member of the

**The advisory board  
is 32 kids, ranging in age  
from 7 to 14.**

magazine's advisory board. Martinez also stressed how much kids dislike being talked down to by adults. And she gave two reasons the magazine chooses to use scientific terminology: "You wouldn't be talking down to kids," and it would help "increase your vocabulary and expand your horizons and all that."

In describing kids' reactions to *ZiNj* she said, "I've seen

little kids walk past a *ZiNj* magazine and they will just turn and stare. They're just so captivated by what's on the cover. You don't see that very often—kids interested in science."

Getting kids interested in science is the goal of the magazine, and Jones has some definite ideas on how to do that. In addition to the articles that kids write, *ZiNj* features a number of articles written by scientists. Jones prefers to have scientists write the articles themselves rather than have a nonscientist report on a topic from a journal and then write about it especially for kids.

It's the personal involvement and enthusiasm of the individual scientist that Jones wants to get across to his young readers. He wants scientists to tell about their personal experience—not just "we found that and it means this."

Jones wants scientists to explain why they're working on that particular project and what's interesting about it to them. "We'd really like them to tell us what they'd like to know next—what they haven't learned yet about whatever they're studying." This would "help kids understand that even the best scientists don't have all the answers, and the reason they keep coming to work every day is because there are more interesting questions to be answered."

Jones is hoping that some **Mammoth Trumpet** readers will be eager to

contribute articles to *ZiNj* about the fun they have working on interesting projects. [Issue 3 featured Bradley J. Lepper's article on excavating the Burning Tree Mastodon near Newark, Ohio (**MT** 6:1 and 6:4), where live bacteria from the 11,000-year-old animal's gut were discovered. "IT'S ALIVE!" screamed the headline. And "A real GUT wrencher!!"]

*ZiNj* is published in Salt Lake City by the Utah Division of State History, the U.S. Forest Service, the National Park Service and the National Park Foundation. Last July *ZiNj* became an independent nonprofit organization and is no longer a part of Utah state government. This step was taken, says Jones, with the expectation that *ZiNj* will now be able to utilize various outside funding sources and can meet its goals more readily without all the rules and encumbrances of government programs.

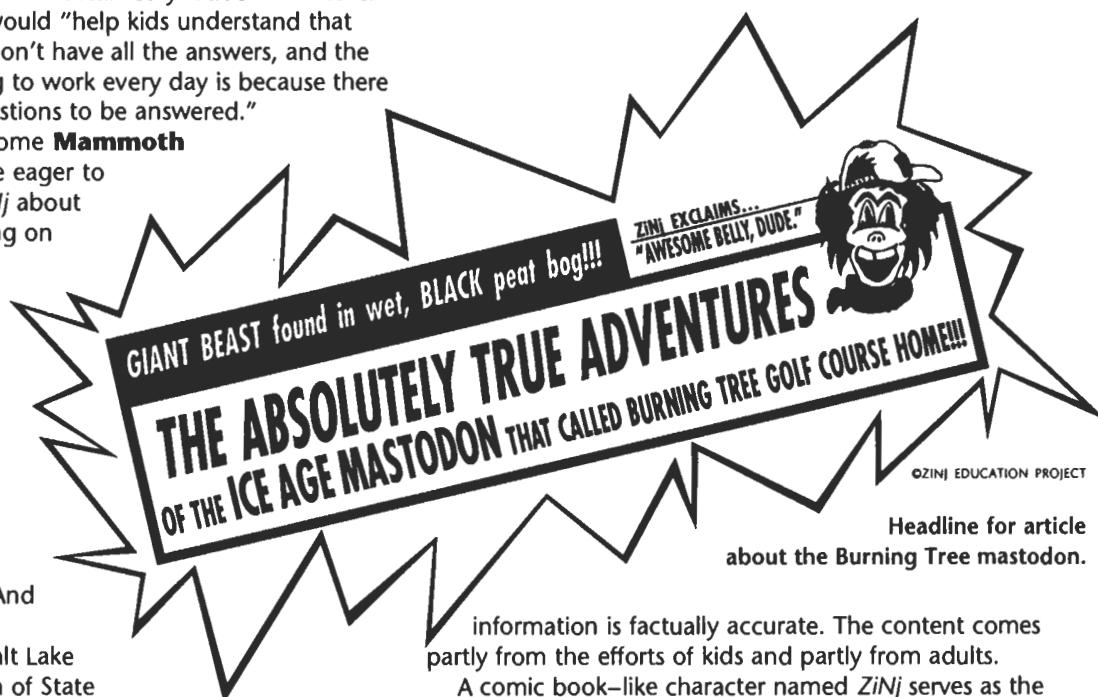
The magazine's concept and content are put together at the Utah Division of State History, but the actual design and layout are done by a private, local graphic design company. National sponsors include the U.S. Forest Service, National Park Service, and the National Park Foundation. Regional sponsors are the Utah Division of State History; U.S. Forest Service Intermountain Region; National Park Service Rocky Mountain Region; and the Bureau of Land Management, Utah. Original funding came from the Utah Division of State

History, the Bureau of Land Management, the U.S. Forest Service, and the National Park Service. Jones does not see that changing.

Its growing circulation of around 3,500 also includes some international subscribers. The cost is quite reasonable at four issues for only \$8. In addition to sending to individual subscribers, *ZiNj* fills bulk mail orders that go to museum gift shops, schools, and bookstores around the country.

Each issue of *ZiNj* focuses on a particular theme. Issue 1 covered dinosaurs in general and the children's book *Dinotopia*, while issue 2 looked at the science behind the science-fiction movie *Jurassic Park*. Extinct Ice Age mammals were the subject of issue 3, and the fourth issue is examining our "built" environment, both past and present.

When doing articles for the magazine, kids are paired up with scientists who make suggestions and help ensure that



Headline for article about the Burning Tree mastodon.

information is factually accurate. The content comes partly from the efforts of kids and partly from adults.

A comic book–like character named *ZiNj* serves as the editorial voice of the magazine, and the text doesn't shy away from difficult words as it explains that "*ZiNj* is short for *Zinjanthropus*, the scientific name given to an early, human-like fossil from Olduvai Gorge in Africa. *Zinjanthropus* is a combination of two words—the Arabic word for East Africa plus the Greek word for human."

Glaring menacingly from the cover of the first issue is a color rendition of a *Tyrannosaurus rex* engaged in a swampy face-off with a *protoceratops*. The magazine gets off to a highly imaginative start with 13-year-old Megan Nibley's interview of James Gurney, the writer and illustrator of the children's book *Dinotopia*. Included are a number of Gurney's fanciful drawings of a time and place where humans and dinosaurs lived in splendid harmony.

Another *ZiNj* article, "Dino Doo Doo," describes a scene in the movie *Jurassic Park* where Dr. Ellie Satler, played by Laura Dern, puts on rubber gloves to examine some drop-




pings. In typical kid-talk it goes on to say, "Yuck! Major gross! Why would she want to do such a thing?" It then explains about coprolites and how "droppings are a gold mine of information" for paleobotanists, and ends with "That's the real poop."

Martinez told the **Mammoth Trumpet** about interviewing the kids in the movie *Jurassic Park*, Ariana Richards and Joey Mazzello, for the second issue of *ZiNj* magazine. Talking to them by telephone, she learned that she and Ariana Richards both have in common a serious interest in archaeology. The young actress said that before making the movie she had no particular interest in dinosaurs, but now she reads everything she can about them and has even gone on a dig in Montana with paleontologist Jack Horner, who was a consultant on the movie.

Martinez, who is thinking about becoming an archaeologist herself, wrote a fictional story about the

For information about subscriptions or submissions to *ZiNj*, contact Kevin Jones or Jennifer Rogers at the *ZiNj* Education Project, Utah Division of State History, 300 Rio Grande, Salt Lake City UT 84101.

Anasazi people that is appearing in the fourth issue of *ZiNj*. She critiques each issue along with 10 to 20 other kids before it goes to press. At this so-called "ZiNj Binge," which includes pizza, the kids read the articles and try out the various puzzles and experiments. A few features have been dropped from the magazine because of negative reactions from the kids.

In one entertaining project, "amberizing" a dead bug, the kids placed a small dead bug on a piece of plastic wrap and covered it with a few drops of colorless nail polish. It was messy, but everyone had a lot of fun, said Martinez. Making a rock-art mural was another project that the kids had fun doing, she said. They ground minerals and rocks to make their own paints and applied them to brown paper as they tried to replicate drawings that they found in books on rock art. 

—Carol Ann Lysek

## SUGGESTED READINGS

### ON Diring Site

Mochanov, Yuri A. 1993 The Most Ancient Paleolithic of the Diring and the Problem of a Nontropical Origin for Humanity. *Arctic Anthropology* 30:22–53.

Ackerman, R. E. and Roy L. Carlson 1991 Diring Yuriak: An Early Paleolithic Site in Yakutia. *Current Research in the Pleistocene* 8:1–2.

Waters, M. R. 1992 *Principles of Geoarchaeology*. University of Arizona Press, Tucson.

### ON Aubrey Clovis Site

Bradley, Bruce 1993 Paleoindian Flaked Stone Technology in the North American High Plains. In *From Kostenki to Clovis, Upper Paleolithic—Paleo-Indian Adaptations*, edited by O. Soffer and N. D. Praslov., pp. 251–262. Plenum Press, New York.

Banks, L. D. 1990 *From Mountain Peaks to Alligator Stomachs: A review of Lithic Sources in the Trans-Mississippi South, the Southern Plains and Adjacent Southwest*. Memoir 4, Oklahoma Anthropological Society, Norman.

Ferring, C. R. 1989 The Aubrey Clovis Site: a Paleoindian Locality in the Upper Trinity River Basin, Texas. *Current Research in the Pleistocene*, 6:9–11.

Ferring, C. R. 1990 The 1989 Investigations at the Aubrey Clovis Site, Texas. *Current Research in the Pleistocene*, 7:10–12.

Haynes, C. V. Jr. 1993 Clovis-Folsom Geochronology and Climatic Change. In *From Kostenki to Clovis, Upper Paleolithic—Paleo-Indian Adaptations*, edited by O. Soffer and N. D. Praslov., pp. 219–236. Plenum Press, New York.

### ON Savannah River Quarry Site


Goodyear, Albert C., Sam B. Upchurch, Tommy Charles and Alan Albright 1985 Chert Sources and Paleoindian Lithic Processing in Allendale County, South Carolina. *Current Research in the Pleistocene* 2:47–49.

Goodyear, Albert C., James L. Michie, and Tommy Charles 1990 *The Earliest South Carolinians. The Paleoindian Occupation of South Carolina*. The Archaeological Society of South Carolina, Occasional Papers 2. Columbia.

Goodyear, Albert C., Tommy Charles and James L. Michie 1993 Early Peoples of South Carolina. *South Carolina Antiquities* 25(1 & 2):23–29.

### ON Rock Art Conservation


*Art and Archaeology Technical Abstracts* (AATA), The Getty Conservation Institute, Marina del Rey, Calif.

*Preserving our Rock Art Heritage*. Crotty, Helen K. (editor) 1989 Occasional Paper #1, 14th Annual ARARA Conference, American Rock Art Research Association, San Miguel, Calif. 

## New Books

*Early Human Occupation in British Columbia*, edited by Roy L. Carlson and Luke Dalla Bona. UBC Press. 1995. 288 8½-by-11-inch pages. \$65.00.

Physical evidence for the earliest peoples in British Columbia as well as inferences based on that evidence is presented in this book. Its 20 chapters are the works of 22 archaeologists whose work focuses on the question of how long people have

lived in the various parts of the vast province. Carlson, a founding member of Simon Fraser University's Department of Archaeology, provides the introduction and an epilogue. Other chapters are grouped into five sections: fluted point and Plano traditions; Intermontane stemmed point tradition; pebble tool tradition, microblade tradition; and traditional cultures. Dalla Bona is with the Ontario Ministry of Natural Resources at Lakehead University. 

## Siberia

*continued from page 1*

Dyuktai cultural occupation that Mochanov has traced to more than 30,000 years ago?

These questions, Waters mused, may keep researchers going for another century. "I've got to credit Mochanov for all the work he's done out there in such adverse environmental conditions," he added. "It's just phenomenal."

Waters first met Mochanov and Fedoseeva and heard about Diring at a conference in Novosibirsk in 1990. As a geoarchaeologist with a deep interest in the Pleistocene peopling of the Americas, Waters specializes in applying the concepts and methods of the geosciences to archaeological research problems. Mochanov invited Waters to visit Diring especially to collect samples that might confirm the antiquity of the pebble tools. When Waters returned to Siberia in 1993, he spent three weeks studying the Diring site. He presented his analysis of the site at the 1995 annual meeting of the Society for American Archaeology, and work on the data is continuing.

At Diring Yuriak (Deep Creek), Waters examined previously excavated exposures, from the toe of the terrace above the Lena, back to the site's deepest excavations. Diring is a vast site; views of it suggest an open-pit mine rather than an archaeological site. In laying bare the cultural surface, Mochanov has excavated more than 60,000 cubic meters of earth. "My objective," Waters said, "was to examine the stratigraphic context of the archaeological material, determine the depositional environments at Diring and to collect samples for dating."

Diring has no volcanic material, so dating can't be done by the potassium-argon or fission-track methods, and there's no bone or carbonates to submit to uranium-series dating. The only technique currently available is thermoluminescence, the method archaeologists often use to date ceramics and fire-treated flint and that geologists use to date loess deposits. The technique dates the last time a sample was exposed to sunlight or heat. After deposition in the earth, particles begin taking on electrons from surrounding sediments, and these



Extensive Diring site excavations followed the cultural horizon into a bluff high above the Lena River. Bluffs on the river's opposite bank are visible in the distance.

ROBSON BONNICHSEN

electrons are trapped within the structure of their crystals. Those trapped electrons become the thermoluminescence signature (See **Mammoth Trumpet** 9:3, "Measuring Energy Stored in Trapped Electrons").

Thermoluminescence, or TL, dating is most appropriate for eolian (wind-borne) sediments, and is considered much less so with fluvial (water-borne) material. Exposure to sunlight while being blown through the air resets the atomic clocks of each particle to zero, but particles carried by water may remain in too murky an environment to have all their former time-signal removed. Thus, it was critical for Waters to ascertain that the apparent eolian strata at Diring were, indeed, deposited by wind.

Waters analyzed individual grains of sands and silts from Diring and found both their size and texture are typical of eolian sediments. His textural analysis of the silty material produced a frequency curve that fell exactly on the line with that of known loesses from around the world. In addition, scanning electron microscope analysis done by eolian geomorphologist Vatche Tchakerian of Texas A & M found that grains from Diring all had classic eolian features including rounding, so-called upturned plates, smooth surfaces and elongate grooves.

"When you combine *that* evidence

with the textural evidence and the field observations, it's really clear that these are eolian sediments," Waters said. Some of the sediments overlying the cultural layer are silty loess, ideal for TL dating because the small size of the grains assures complete zeroing of their atomic clocks.

Satisfied his analysis of Diring's stratigraphy identified strata above the cultural horizon as eolian, Waters could be confident that thermoluminescence should produce credible results. Of course, his own careful collection of samples also was crucial to the TL dating.

"I dug back more than a meter in most cases," he said, explaining that he wanted to get well beyond any potential contamination from the sun beating down on the surface exposed by the archaeological excavation. Each sample involved pounding a 20-cm length of 1-inch PVC pipe into the formation with a rubber mallet. He had previously sealed the outer end with a pipe cap. Then he dug back and capped the other side, thus capturing a section without exposing it to sunlight.

It is also necessary to collect a "halo" of sediment from around each sample for use in determining the background radiation the sample has received. That part doesn't have to be kept dark.

Because he was carrying what might look like a collection of little bombs, inter-

national travel proved trying for Waters, but after several stressful days he and his samples were safely in the United States.

Geochronologists Steven Forman and James Pierson at Ohio State University have been analyzing the samples. "Steve and Jim have really worked on those samples," he said, noting that the work is slow. Now, he said, each sample has produced what looks like a telephone book of information about it from all the testing. There are 10 samples, and results can be taken both from the fine-grain fraction, which should have had the best chance at being completely "bleached" of TL signals before deposition, and from sand grains. If results from different portions correspond, the scientists are confident of the dates.

Conditions at Diring seemed to have been perfect for allowing the scientists to push the bounds of the TL method. "What we found is that the cultural horizon has to be greater than 250,000 years old," said Waters. He's confident of the date because he obtained similar results from four fine-grain samples from Mochanov's unit 13, a loess deposit, and from a quartz fraction in one of those samples. "All of them overlap and agree with one another."

That particular deposit overlies the cultural horizon by three to four meters. But what about deposits below the cultural horizon?

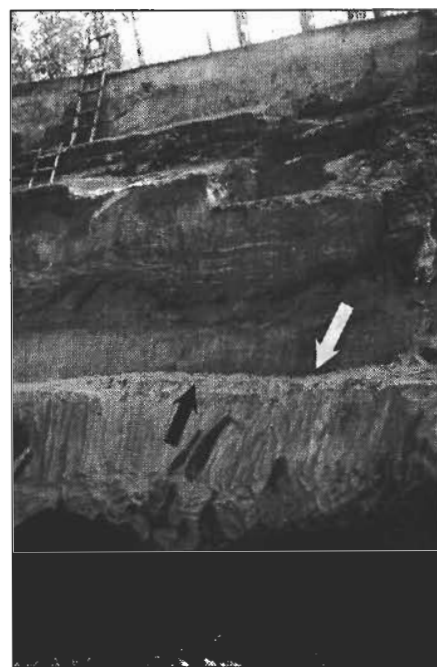
Diring's human inhabitants had been collecting and working stone on a deflated surface. Sediments underlying that deflated surface had been deposited much earlier by an ancestral Lena River,

and because they are fluvial, they are not well suited to TL dating. However, the area had been an Arctic desert, and in the bitter cold the sediments cracked. Ice would have filled the cracks if it had not been so dry, but at Diring they filled with blowing sand, which formed sand wedges. When examining Diring's stratigraphy, Waters observed characteristic vertical bedding of the sand wedges; his sedimentological analyses proved that they demonstrated classic eolian features.

He obtained two samples from within large sand-wedge deposits below the cultural horizon and two from eolian deposits immediately above it. In the lab, two of the samples, one from above and one from below, proved saturated—they seemed to be older than the limits of TL testing. The other two indicated antiquity of about 300,000 years, very close to the upper limits of the TL method. Because there are only two dates, Waters is not confident they represent the true age of the cultural layer.

Waters's field work was funded by the National Geographic Society, and the additional dating work has been funded by National Geographic and the Advanced Research Program of the State of Texas.


While Waters has no data to support the 3-million-year-old date Mochanov's team had suggested for the cultural surface, he has no doubt about Mochanov's analysis of the tools. "Some people have looked at the artifacts and said, 'Oh, these things are *geofacts* created by cryoturbation or some other process.' Well, that's not true, because if you look at the total assemblage, there's definite patterning to



Diring's cultural horizon is indicated by arrows.

the artifacts, especially the ones Mochanov refers to as unifacial choppers. There are flakes with striking platforms and bulbs of percussion on them." Perhaps just as convincing, he added, are the lithic clusters Mochanov found around anvil stones. "I looked at the depositional environment, and there's no geological process that could have created this material," said Waters.

"They're definitely human-made artifacts." Waters believes their existence at 61 degrees north—about the same latitude as Anchorage, Alaska—demands much more research in the Lena Basin. And he would like to do more TL dating of samples from immediately above and below the cultural surface.

Data now available, including high-resolution oxygen-isotope measurements that document glacial and interglacial periods in deep-sea cores, suggests the tool-makers may have lived on the Lena toward the end of a glacial period or early in an interglacial. Climate might have been comfortable briefly in summer, but the very thought of those Siberian winters can intimidate a Texas scientist. Those first inhabitants, regardless of how many millennia they were away from Africa's balmy savannas, must have been a vigorous and resourceful population. 

—Don Alan Hall

Yuri Mochanov  
points out  
Diring stratigraphy  
to visiting  
archaeologists.

