



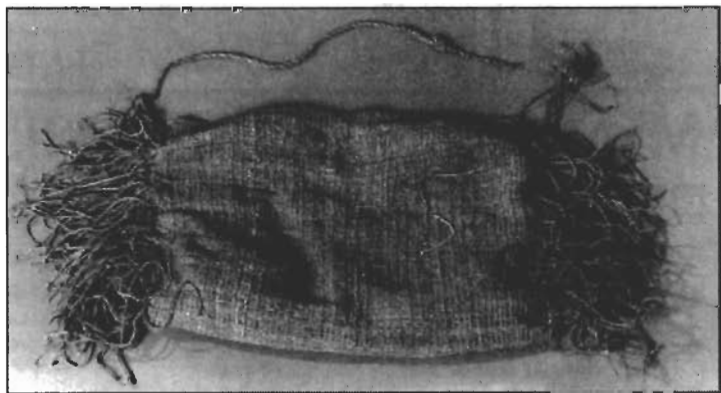
MAMMOTH TRUMPET

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

Perishable Evidence

The surprising discovery that Nevada's Spirit Cave mummy is more than 9,000 years old (page 1) focused scientific attention on the beautifully crafted fiber artifacts found with the mummy. This fringed bag of close-twined hemp and sagebrush cordage is an example of hand-weaving as technically advanced as any later weaving in the Great Basin. It is not duplicated in later styles. James M. Adovosio explains the value of perishable fiber artifacts in an interview beginning on page 18.



SCOTT KLETTE/NEVADA STATE MUSEUM

The 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.

MAMMOTH TRUMPET



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REMARKABLE DISCOVERY

Though Science Sometimes Takes Time,
The Consequences Can Be Spectacular

In the heat of a Nevada summer, Georgia and S. M. Wheeler explored rockshelters in the sun-baked Carson Sink area. The couple hoped to find archaeological sites providing evidence that people had lived there during the period when Pleistocene Lake Lahontan was receding from its maximum level approximately 10,500 years ago. Their work for the Nevada State Parks Commission ultimately documented 26 caves and shelters, most containing archaeological materials.

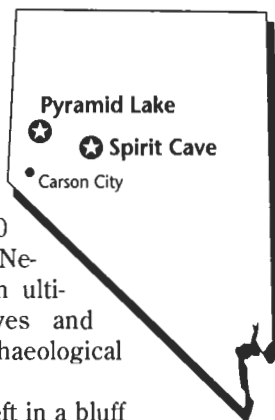
They debated whether a cleft in a bluff they had seen many times before might be worth a look. Possibly not, but they decided to investigate. It was a mile from the nearest roadway to the little cave, which faced toward the west. The day was Aug. 11, 1940.

After trudging through hot sand and scrambling over the rock terraces left by the ancient lake, they probably were disappointed by what they found. The cave was no more than 5 feet high, 25 feet wide, and barely 15 feet deep. It offered a little shade and was protected from rain or runoff, but it wouldn't have sheltered much of a living space. Ceiling and walls were covered with the tufa—calcium carbonate deposits left by evaporation of waters from the ancient

lake—and there was little evidence that there had been fires in the cave.

S.M. was ready to head back to their station wagon, but Georgia protested. They had walked all that way, so why not put in a test pit?

Her husband relented. In a report published years later, he described the scene: "On the left, as we looked in, a slightly raised portion of the floor was bordered by a quarter circle of rocks, which extended from near the center of the rear wall to the north wall just inside of the entrance."



Georgia Wheeler Excavates

He decided to explore the inner room while she started to excavate within the area enclosed by the arc of rocks. There, amid the delvings of rabbits and other animals, they made a truly remarkable discovery.

"The first foot revealed no evidence of occupancy, just dry, windblown sand. Under this she laid bare a portion of what had been a large mat, very finely twined, with the warp of split tules and the weft of native hemp cord. When completely uncovered, this was found to be wrapped around a few human bones, all that remained of some

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FIRST AMERICANS SESSION APRIL 24

Leading scientists will address the question "Who Were the First Americans?" April 24 at Oregon State University's 58th Annual Biology Colloquium. The one-day event is open to the public at no charge; however, preregistration is requested.

Biochemist Douglas C. Wallace of Emory University, physical anthropologist Richard Jantz of the University of Tennessee, geneticist Anne Stone of the University of Arizona, physical anthropologist D. Gentry Steele of Texas A&M University, and forensic anthropologist Douglas Owsley of the Smithsonian Institution will join three Oregon State University scientists to give presentations at the colloquium. They are anthropologist Robson Bonnicksen, director of the **Center for the Study of the First Americans**; microbiologist Katharine Field; and agricultural chemist Walter L. Ream.


Dr. Bonnicksen will open the colloquium with an overview of archaeological knowledge about the peopling of the Americas. Dr. Stone's presentation, "Reconstructing Human Genetic Systems with Ancient Molecules," will follow, and Dr. Wallace's talk, "Using DNA to Model

will convene a panel consisting of Owsley and archaeologists Dennis J. Stanford and Francis P. McManamon. Dr. Stanford is with the Smithsonian Institution, where he is Curator of Anthropology, Director of the Paleindian Program, and Chair of Department of Anthropology; and Dr. McManamon is with the U.S. Department of the Interior, where he is Chief of the Archaeology and Ethnography Program and Departmental Consulting Archaeologist, National Park Service.

If you'd like to attend the Colloquium, please register before April 15 by contacting the **Center for the Study of the First Americans**, 355 Weniger Hall, Oregon State University, Corvallis OR 97331, 541-737-4595 (fax 541-737-3651) or e-mail to halla@cla.orst.edu.

The annual Biology Colloquium is

sponsored by Oregon State University's Research Office, and its colleges of Agricultural Sciences, Forestry, Science, and Veterinary Medicine. Bonnicksen, Ream, and Field are organizing this year's event, which will begin at 8 A.M. in the LaSells Stewart Center, 26th Street at SW Western Boulevard on the OSU campus in Corvallis. The Colloquium will conclude with a reception at 5 P.M. Though refreshments will be provided at morning and afternoon breaks, participants will have to go out for lunch.

For travel and accommodation information, please contact the Corvallis Convention and Visitors Bureau: 541-757-1544 (fax 541-753-2664), or visit the bureau's site on the World Wide Web at WWW.visitcorvallis.com/ccvb. The bureau's mailing address is 420 NW 2nd St., Corvallis OR 97330. 

Session to Examine Clovis

A session titled "*Clovis in Context: New Light on the Peopling of the Americas*" is scheduled for April 3 at the annual meeting of the Society for American Archaeology in Nashville, Tenn. Anna C. Roosevelt and Julie Morrow have organized the session to explore questions of the antiquity of Clovis.

the Peopling of the Americas," will conclude the morning's program.

Drs. Field, Ream and Bonnicksen will begin the afternoon session with their presentation, "Extracting DNA from Ancient Hair." Dr. Owsley and Dr. Jantz will give a presentation on "The Smithsonian Skeletal Analysis Program and the First Americans," then Dr. Steele will describe "The Paleo-American Skeletal Record of North and South America."

A panel discussion, "What Does the New Evidence Mean?" will conclude the colloquium. Attorney Alan L. Schneider



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Bering Land Bridge Was Open until 11,000 Years Ago

Scrub Tundra Grew in Lowland Beringia, Not 'Mammoth Steppe'

JUST A FEW DECADES AGO, Beringia, the land linking North America and Asia during glacial times, was a hypothetical concept. But as evidence mounted of biological connections between Siberia and Alaska, and knowledge of changing sea levels came to light, the notion of a land bridge allowing free passage of animals and humans became universally accepted. Until recently, the connection was thought to have been severed by rising sea levels about 14,000 years ago.

Now, thanks to research by Scott A. Elias and his colleagues, we know the link remained in place until sometime after 11,000 years ago, probably being flooded about 10,500 years B.P. The event cut the Americas off from Eurasia for the first time in many thousands of years. When the level of the Pacific Ocean rose to within about 40 meters of its present level, it spilled across into the Arctic Ocean.

Dr. Elias, of the University of Colorado's Institute of Arctic and Alpine Research, is able to tell us much about the lowland that once constituted the land bridge because of careful research on cores previously collected by the U.S. Geological Survey from the floor of the Chukchi and Bering seas. Not only did the work reveal that the land bridge was open to passage long after scientists thought it had been closed, the research provided new insights into the environment before the continents were separated.

Elias found that land bridge lowland had been covered with shrub tundra that would not have provided much food for grazing animals; he found no evidence of the steppe tundra that some believe must have been plentiful to nourish the great Pleistocene bison and mammoth herds with its grasses.

However, it is clear that people and animals could have freely crossed the land bridge until 11,000 years B.P. Elias can describe the paleoenvironment of the land bridge because of research he and his colleagues have done on pollen and the remains of insects and plants. These environmental markers became preserved in shallow pools in the Beringian lowland, and when melting glaciers raised sea levels, the fossils were protected from the flood.

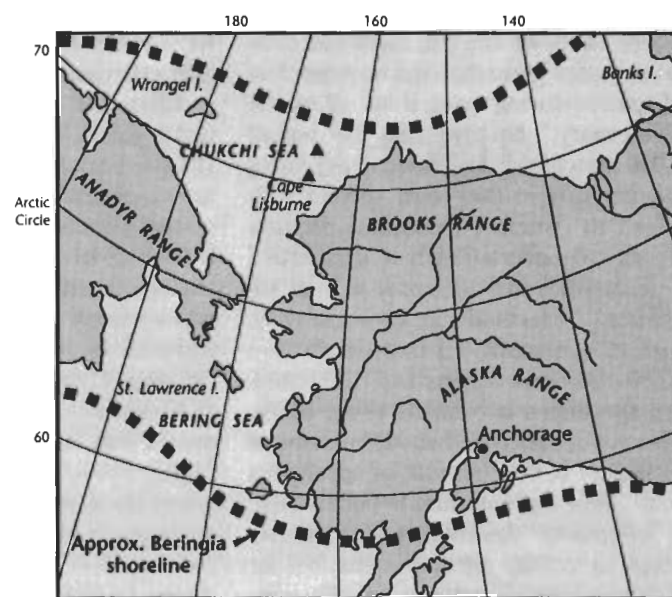
The research had its origins more than a decade ago when the U.S. Geological Survey sailed the U.S. research ship *Discovery* in the Bering and Chukchi seas to gather geologic and geophysical information. The project included the taking of

dozens of cores from the sea floor. These cores, about 10 cm in diameter, ranged up to nine meters in length. After the voyage, the USGS stored the cores, sealed in plastic tubes, under refrigeration at Palo Alto and Redwood City, Calif.

Elias began his research by looking through the core logs from USGS cruises in the Bering and Chukchi seas. The goal, of course, was to find cores that would yield information about the most-recent terrestrial deposits—layers that could be expected to contain plant and insect remains.

"We picked cores that had organic lenses near their tops," Elias said. "We knew that these organic layers would represent the land bridge." The topmost core material represented Holocene marine sand, deposited after the Pacific Ocean had flooded northward. Below that were sediments from the land bridge. Below the land-bridge sediments the cores revealed an as-yet-unexplained gap in the geologic record—the next sediments are Cretaceous in age.

Elias and his colleagues then went to the USGS storage rooms to look up their chosen cores. It wasn't quite like looking up a reference in the library, because about half of the cores were stored in a refrigerated trailer near the bay at Redwood City. During the Loma Prieta earthquake a few years previously, all the cores in the trailer had fallen from their shelves and they remained in a jumble on the floor. "We had to unload literally the entire contents of the trailer—hundreds of cores—out into the parking lot in order to find the ones we were interested in."



The Beringia land bridge—which was open as much as 4,000 years later than was previously thought. Triangles mark locations of youngest core samples.



They dug the organic lenses out of the cores and took them back to Boulder to extract the fossils. "The organic deposits were easy to differentiate because they are nearly black, whereas the rest of the sediments are nearly sterile marine sands and clays, tan to gray in color."

Accurately dating the deposits was a high priority of the research team. Previous land-bridge closure dates had been obtained from radiocarbon analysis of bulk samples, and there was a suspicion of contamination by coal. Elias and his colleagues wet-screened the samples to remove any such material, and chose individual macrofossils for radiocarbon dating by accelerator mass spectrometry. Elias found that samples of cores taken in the Chukchi Sea could provide the most accurate dating of the submergence of the land bridge.

AMS dates from screened peat from cores taken north of Alaska's Cape Lisburne were $11,330 \pm 70$ years B.P. (Beta 43952) and $11,000 \pm 60$ (Beta 43953). Analysis of the cores, then, indicated that the sea covered the land bridge after 11,000 B.P.; probably by 10,500 B.P.

Elias's insect analysis is done the same way archaeologists do faunal analysis of larger animals. "I compare my fossils with modern specimens in museum collections." There are two principal differences between analyzing remains of beetles and remains of mammals—evolution and scale.

"As far as we can tell, there has been no evolution of species and no extinction of species during most, if not all, of the Quaternary," he says. "So 999 out of 1,000 insect fossil specimens have living counterparts in their own species with which to compare ecological requirements and modern distribution patterns."

Elias finds insects' small size an advantage. "Insects are far easier to work with than mammals. I have more than 10,000 fossil specimens and 5,000 modern specimens in cabinets in my office, whereas a fossil- and modern-mammal collection of this number of specimens might take a gymnasium to house. I use a low-power stereo-binocular microscope to identify my specimens, but for picture taking, I prefer to use the scanning electron microscope because the images of three-dimensional specimens are sharper."

The research went back in time far beyond the final submergence of the land bridge. Elias says that fossil samples fell into three age classes—more than 40,000 years old, 20,000–14,000 years old, and 14,000–11,000 years old. Generally, the oldest period represented an environment of birch-heath-grass tundra with a few shrubs, while the middle period was tundra with fewer heaths. The latest period again was dominated by birch-heath-grass tundra—moderately moist—and there were small ponds choked with aquatic plants. By 12,000 years B.P. summer temperatures were as warm as they are now, and by 11,000 B.P. summers

YUKON BERINGIA MUSEUM TO OPEN

The Yukon Beringia Interpretive Centre is scheduled to open in May in Whitehorse. The new museum will feature life-size dioramas, a full-scale model of a woolly mammoth family and giant beaver, interactive exhibits, skeletal remains and reconstructions of Pleistocene animals, and a 200-seat theater featuring a film on Beringia sites in the Yukon. The museum is beside the Alaska Highway near the Whitehorse airport.

were warmer than Alaska's north slope now experiences.

Elias and paleobotanist Susan K. Short (INSTARR) and Hilary H. Birks (University of Bergen, Norway) found no evidence for steppe-tundra vegetation at any period. R. Dale Guthrie of the University of Alaska's Institute of Arctic Biology has hypothesized that Beringia was a vast steppe covered with grasses and sagebrush. Dr. Guthrie, an authority on large Pleistocene mammals, argues that Alaska's plentiful fossil record means that Beringia must have offered highly productive grazing to have allowed bison, mammoths, and other grazers to reach such giant size. Elias and his colleagues, however, have not found evidence of extensive expanses of that steppe habitat, nor had earlier work by palynologists. Is Guthrie wrong?


"I think that we could easily both be

right," said Elias. "The land bridge may have been a narrow waist of mesic tundra surrounded by steppe-tundra landscapes on either side." He notes that the land bridge probably could not have sustained many big grass eaters. "I don't think that there was much for megafaunal mammals to graze on out there on the land bridge, but they may have migrated across the narrowest part of the Bering Strait region in just a few days."

"Based on our evidence, grazing animals and their human hunters probably spent little time on the land bridge. Shrub tundra offers too few food resources for the animals."

As far as the timing of human migration across the continental link, Elias doesn't believe evidence that the land bridge was usable until after 11,000 years B.P. has anything to say about when the first people reached North America. "Certainly the new dates mean that the land bridge was available to people until Clovis time, but the land bridge had been open for many thousands of years before then, as well. Furthermore, you can still walk from Siberia to Alaska across the Bering Strait in winter." Because the water is so shallow, he says, it often freezes completely; Inuit people travel between Alaska and Siberia to visit friends and relatives.

Elias would like to broaden his research by examining deposits from other areas. "First I'd like to get cores from the southern part of the Bering shelf—the south sector of the land bridge." Deposits from cores taken in waters south of the Bering Strait yielded older dates, possibly because the stormier sea caused erosion of the most recent terrestrial deposits. "Second, I'd like to get my hands on cores from the Russian side of the Bering and Chukchi seas."

He says Russian scientists took cores there about the same time the USGS was coring on the Alaskan side. "I have recently sent out an e-mail to Russian colleagues in Moscow, trying to find out where these cores are being kept and whether I could get permission to go sample from them. I hope that the cores haven't been lost or thrown out, but with the near-collapse of the Russian science infrastructure, I am worried about the fate of these cores." 

—Don Alan Hall

New Books

American Beginnings: The Prehistory and Palaeoecology of Beringia, edited by Frederick Hadleigh West. University of Chicago Press. 1996. 576 8½-by-11-inch pages. \$75.00 (clothbound).


This big compendium of papers presents a broad picture of Beringia, a region West sees as the key to understanding the peopling of the Americas. "Far too much of the debate on the earliest peopling of the New World proceeds with only perfunctory reference to the very region where it all began and even less to the significance of that fact," he writes in the preface. West, Director of Archaeology at the Peabody Essex Museum, Salem, Mass., is author of the 1981 book, *The Archaeology of Beringia*.

An introduction by the University of Alaska's David M. Hopkins describes origins of the concept of Beringia, initially suggested in the 1930s, when the land bridge was only a hypothesis, to explain the floras of northeast Siberia and Alaska. Hopkins's personal definition of Beringia is the territory west of the Mackenzie River and east of the Kolyma River, but the book covers considerably more of Siberia.

The text is organized by paleoenvironmental and archaeological research, with environmental papers being divided between geological and biotic studies. Archaeology is initially divided between work in western Beringia and eastern Beringia. The former is subdivided into three chapters focusing on Aldansk: the Aldan River Valley and Sakha Republic; Priokhote, Kolyma River Basin, and Kamchatka; and Southern Primorye. The latter is subdivided into six chapters focusing on Central Alaska: Tanana River Valley; North Central Alaska Range: Nenana and Teklanika Valleys; South Central Alaska Range: Tangle Lakes Region; North Pacific Littoral, Alaska; Kuskokwim Drainage, Southwestern Alaska; and Seward Peninsula and Brooks Range, Northern Alaska. Each chapter contains several brief papers summarizing a wide variety of research.


The 56 listed contributors have what West calculates as an aggregate of more than 1,100 years of research in the region. The book, he rightfully acknowledges, presents a full representation of basic scientific data on Beringia. Contributors, some of whom are authors or coauthors of more than one paper, are: Robert E. Ackerman, Larry D. Agenbroad, Patricia M. Anderson, Glenn H. Bacon, Nancy H. Bigelow, Linda B. Brubaker, Paul A. Colinvaux, John P. Cook, Mary Lou Curran, Stanley D. Davis, Anatoly P. Derevianko, Nikolai N. Dikov, Thomas E. Dilley, R. Greg Dixon, Scott A. Elias, Svetlana A. Fedoseeva, S. Craig Gerlach, Ted Goebel, Joseph H. Greenberg, R. Dale Guthrie, Edwin S. Hall Jr., Thomas D. Hamilton, Andrew S. Higgs, and John F. Hoffecker.

Also Charles E. Holmes, David M. Hopkins, Maureen L. King, Margarita A. Kiryak, Michael L. Kunz, Yaroslav V. Kuzmin, Anatoly M. Kuznetsov, Ralph A. Lively, Allen P. McCartney, Jim I. Mead, Charles M. Mobley, Yuri A. Mochanov, T. D. Morozova, Peter G. Phippen, Mark E. Pipkin, W. Roger Powers, Richard E. Reanier, Douglas R. Reger, Brian S. Robinson, G. M. Savvinova, Sergei B. Slobodin, Ralph S. Solecki, Savelli V. Tomirdiario, Valentina V. Ukraintseva, Richard VanderHoek, Ruslan S. Vasilievsky, Andrej A. Velichko, Douglas W. Veltre, Christopher F. Waythomas, Thompson Webb III, Constance F. West, and Frederick H. West.

The book's final part, perhaps inaccurately titled "Conclusions," includes a discussion by the editor and an interesting review of linguistic evidence for the peopling of the Americas by distinguished linguist Joseph H. Greenberg. Since he proposed three distinct migrations into the New World a decade ago, Greenberg's "three-wave" hypothesis has been the target of so many critical reports by geneticists, physical anthropologists and linguists, that **Mammoth Trumpet** readers may be more familiar with the criticisms than with the basis of hypothesis. In this paper, he acknowledges that it is in reality a "three-plus-n" theory. 

Pre-Clovis Evidence Accepted

Evidence from the Monte Verde site in Chile, which was excavated by a team led by Tom Dillehay, has officially revised conventional scientific wisdom about initial peopling of the

Americas. A team of eminent archaeologists has unanimously agreed that people were in Chile at least 12,500 years ago. Their conclusion was announced Feb. 10 by the Dallas Museum of Natural History, sponsors of an investigation by archaeologists J. M. Adovasio, Alex Barker, Robson Bonnichsen, Dillehay, Dena Dincauze, Don Grayson, C. Vance Haynes, David Meltzer, Francisco Mena, Lautaro Núñez, and Dennis Stanford. ("Life in Ice Age Chile," **Mammoth Trumpet** 1:1, described Dillehay's findings in 1984). *National Geographic* will have an article on Monte Verde in October. 

Wooden mortar found at the Monte Verde site was used to grind seeds and wild potatoes; fragments of the food plants remain in the cracks of the wood.





American skeletal remains. Details of these studies have yet to be published, but preliminary results will be published in the *Nevada Historical Society Quarterly* this year.

Wizard's Beach Man

The surprising date for the Spirit Cave man was discovered about the same time the Nevada State Museum learned that another skeleton in its collection dated to almost exactly the same era. The other early-Holocene skeleton, known as the Wizard's Beach man, was found in 1978 when a prolonged drought had lowered the level of Pyramid Lake northeast of Reno. The discovery site is only about 100 miles from Spirit Cave. Though scientific details have not been published on the Wizard's Beach man, radiocarbon dating has established that he lived more than 9,200 years ago. Because the skeleton was discovered when Pyramid Lake was lower than it had been in historic times, Dansie says he likely died at a time of severe drought. "We're very interested in trying to understand the details of that climate change," said Dansie.

Dansie and other scientists are excited about the potential these two skeletons and the associated sites offer the study of human adaptation to changing climate. They date to the period when Ice Age environments, which created great inland lakes such as Lahontan, were giving way to the altithermal, the period of maximum temperatures when lakes were drying up or shrinking to the remnants, such as Pyramid Lake, that we know today. It was a time when people were adapting to new lifestyles that included the harvesting and grinding of seeds for food to supplant diets of fish and meat. One significant question these early skeletons address is when and how seed grinding was added to the human adaptations during the early Holocene.

Different from Later People

These two early Nevada men looked somewhat different from most of the people who are known to have inhabited the area about 5,000 years later. Possibly they represent a population that reached North America before other ancestors of today's



Nevada State Museum anthropologist Amy Dansie, center, shows visiting scientists the carefully woven matting that served as a shroud for the Spirit Cave mummy. At the left are Parvene Hamzavi and Shannon Novak, part of the Smithsonian Institution's physical anthropology team; at the right is Richard Jantz, University of Tennessee anthropologist.

Native Americans. Analysis of cranial measurements of skeletons that date to around 9,000 years ago or earlier indicates those people had different morphologies and may have had different roots than later Americans. Forensic anthropologists, expert at determining the physical characteristics of crime and accident victims, say these most-ancient Americans had certain generalized features they see in contemporary Caucasian populations.

Does that mean the first Americans, including the man buried in Spirit Cave and the one whose remains were found beside Pyramid Lake, had European ancestors? Not likely, according to human morphologists, scientists who study change that has occurred over time to human skulls. For example, Dr. Steele's careful analysis of rare paleo-American skeletons has revealed statistical similarities to some modern Asian, Pacific and European populations. Marta Mirazon Lahr and Walter Neves, specialists in human diversity of ancient South Americans, agree that the earliest American skeletons lack some of the specific features that define modern ones. (See "Who Were the First Americans?" *Mammoth Trumpet* 11:3 and 11:4; "Brazilian Scientists Challenge 3-Wave Theory of Migration," *MT* 11:3; and "Paleoindian Skeletal Data Re-examined" *MT* 7:2.)

Dansie believes the two ancient Nevada skeletons exemplify the interrelatedness of humans. "These skeletons are important to remind everybody that we are all of one people," she says. However, she points out that the physical appearance of later peoples in that part of the Great Basin actually was quite different from the early ones. "There's no reason to think they are ancestral to Paiute people," she says. Even Paiute legends say that they were victorious over people who occupied the area

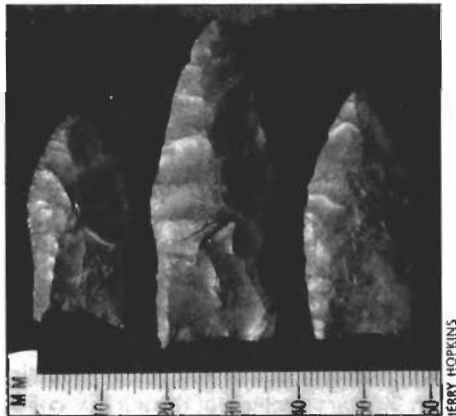
THE DATES

Seven dates obtained from Spirit Cave Burial 2 produced a weighted mean of $9,415 \pm 25$ years B.P. The individual dates:

hair	$9,360 \pm 60$ (CAMS 12354)
hair	$9,350 \pm 70$ (CAMS 12353)
hair	$9,440 \pm 60$ (CAMS 14224)
bone	$9,430 \pm 60$ (CAMS 12352)
twined tule mat	$9,410 \pm 60$ (CAMS 24192)
twined tule mat	$9,460 \pm 60$ (CAMS 24197)
diamond-plaited mat	$9,430 \pm 70$ (CAMS 24199)
Burial 1 (above mummy)	$9,270 \pm 60$ (UCR 3480)
twined hemp bag,	
Cremation 2	$9,040 \pm 50$ (UCR 3478)

other stemmed projectile points, and limaces, all indicative of early occupation. Pleistocene faunal remains are plentiful, and all bone appears to be mineralized, also indicating antiquity. Freshwater mussel shell and fish remains were the most abundant fauna recovered, but small and large mammal remains were also present in lesser quantities. Most of the cultural remains discovered on site appear to represent late-Pleistocene to early-Holocene occupations, but the discovery in some test units of various diagnostic *Olivella* shell beads and freshwater mussel shell (*Anodonta californiensis*), radiocarbon dated to no greater than 2,000 years ago, indicate later occupations also occurred.

In a telephone interview, Fenenga said that shell often is found below the level of the Pleistocene fauna. He is uncertain



Three Tulare Lake points; the center specimen, of brown jasper, is 55.8 mm long.

as to the cause of the inverted sequence, but suggests that centuries of fluctuating water levels, years of agricultural disturbance, and possible bioturbation have left the soils quite mixed. All site deposits are relatively shallow, Fenenga says, usually averaging about 40 centimeters and not over one meter in depth.

Radiometric Dating

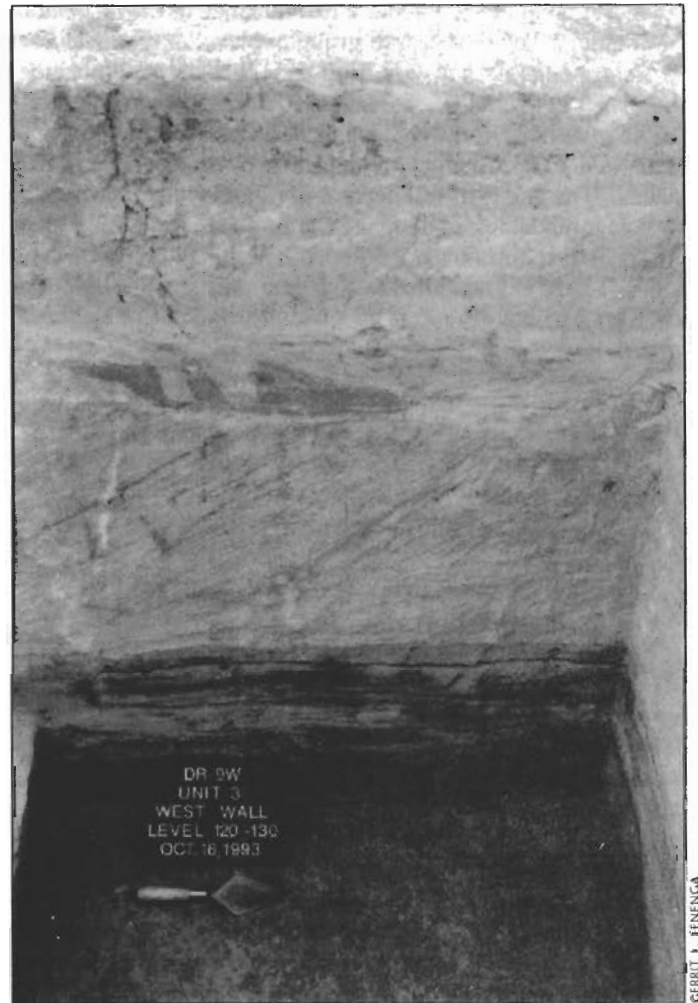
Uranium series radiometric dating methods have returned dates of 11,380 and 15,800 years ago for a sample of mineralized human bone, and dates of 10,788, 15,696, and 17,745 years ago for samples of mammoth, horse, and camel, respectively. Though the interpretation of radiometric dates on out-of-context surface finds may be questioned, the faunal dates were from species expected to have been extinct by at least 10,500 years ago. In addition, Fenenga says, bones associated with more-recent dates do not appear to be mineralized. He suggests that study of the rates of mineralization within the lake environment should provide a means of relative dating for sites in the area. The dates of the human samples provide evidence of human occupation of the Tulare Lake area at least by Clovis times.

Fenenga says field work will continue. He is now working on the analysis of excavated materials. In addition to the lithic and bone analyses taking place, Fenenga would like to investigate the rate of fossilization of faunal and human remains. Ideally he would like to investigate a series of single-age component locations that might demonstrate the degree of bone mineralization over time. He notes that the area also has yielded several fossilized bone artifacts, including a shaft straightener and bone awls, and a fossilized wooden artifact.

325 Clovis-type Projectiles

Though the uranium series dating has come from bone, most of the archaeological materials found around Tulare Lake are lithics. Wallace notes that the greatest share of these are in the hands of private collectors, although some collections have found their way to museums. In a telephone interview, Wallace said that a TULARG member recently acquired an important collection assembled during the first decades of this century that contains Clovis points and other early artifacts from the Tulare Lake region. He said the materials will soon be studied and reported upon. These lithic tools may be out of context from their original location, but the large number of specimens available in private collections for study can provide powerful statistical data with respect to the artifacts themselves.

The Tulare Lake Archaeological Research Group has published reports describing some of the collections. Group member Jerry Hopkins writes that nearly all the Clovis or Clovis-like projectile points in private collections were found along the 190- to 195-foot contour of the lake. The elevation represents



The west wall of the Sloth Hole locality of Tulare Lake's Witt site reveals the stratigraphic sequence down through agriculturally disturbed soil to the limit of deposits that contain bone and artifacts. An excavation extending over nine square meters here yielded 15,000 pieces of bone and 672 pieces of flaked stone.

JOSÉ LUIS LORENZO died in Mexico City in July 1996. Born in Madrid, Spain, in August 1921, he came to Mexico in 1939, as did many others, a refugee of the Spanish Civil War. His studies included a major in biology at the National Polytechnical Institute, and in 1951 he received his degree in archaeology at the National School of Anthropology. He later received his master's at the University of Mexico, where he also did his doctoral studies. In his graduate work he studied at the University of London's Institute of Archaeology and with François Bordes at the University of Bordeaux.


Lorenzo's institutional affiliation was mostly with the National Institute of Anthropology and History, where he became head of the Department of Prehistory and of the Department of Prehispanic Monuments. He was named Professor Emeritus in 1985. He taught for many years at the National School, and at the University he conducted the graduate program in anthropology.

Lorenzo's work touched several subjects, principally archaeology and geology. The importance of his work in archaeology, especially prehistory, is shown by the sites he dug and published, including Popocatepetl, Yanhuitlan, Tepexpan, Teopisca and Tlapacoya. His work testifies to his interest in the peopling of the Americas. In geology—Quaternary research, especially in glaciology—he was a recognized authority, and contributed many papers on specific problems and on general concepts. Some of his studies will be quoted for many years. After a youthful affection for hiking, mountain climbing and diving, Lorenzo's archaeology reflected his experiences and his way of looking at his profession. Reflecting his contacts with F. E. Zeuner's work in London, and the teachings of Pedro Armillas, certainly one of his mentors, he was very concerned with the relation of archaeology with the natural sciences. He succeeded in establishing a series of laboratories at the department of prehistory that included botany, zoology, chemistry, and petrography. Lorenzo's experience in prehistoric sites in Europe, especially with Bordes, was reflected in

his concern with developing careful and exact techniques for digging. His sites certainly reflected this preoccupation. This was also seen when he headed Mexican government salvage projects.

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Lorenzo had close relationships with other Latin American archaeologists. The presence in Mexico of his friends and colleagues from South America was an important event in learning archaeology for his students and assistants. His work in Peru in 1974, heading archaeological projects there, was reflected in examples he showed and bibliographies he recommended. Although he retired from teaching, Lorenzo's emeritus status was not retirement—he kept working, field and lab, on his subjects. And being a socially concerned archaeologist, he was always active in the defense and protection of archaeological sites, giving talks, holding discussions and heading projects for that purpose.

Lorenzo's death is a loss not only for Mexican archaeology. Latin American, North American and Old World colleagues, geologists, paleobotanists and paleozoologists will miss him—but not as much as we who are his students. 

—Jaime Litvak King

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Elias, Scott A. 1996 Insect Fossil Evidence on Late Wisconsinan Environments of the Bering Land Bridge. In *American Beginnings: The Prehistory and Palaeoecology of Beringia*, edited by F. W. West. University of Chicago Press.

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ON Perishable Fibers

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Peterson, James B. *A Most Indispensable Art*. University of Tennessee Press. 



JOE LATVIS/BRINNEN S. CARTER

Slice of Prehistory Dates back Exactly 10,000 Years

A small fish swims past a corner-notched Bolen projectile pictured in situ on a paleosol at the Bolen component of a site about 15 feet deep in northwest Florida's Aucilla River. Bolen points date to between 10,200 and 9,900 years.

Underwater Site Opens Window on Big Environmental Change

FLORIDA RESEARCHERS are opening a window on a time when Paleoindian hunter-gatherers were adjusting to a dramatic climate shift at the close of the last Ice Age. Early Floridians were poised on the knife-edge of transition to a more sedentary lifestyle.

Evidence from an underwater site in the Aucilla River southeast of Tallahassee is presenting a unique view of the cultural dynamics of the change occurring about 10,000 years ago, according to Brinnen S. Carter, a doctoral archaeology student at the University of Florida in Gainesville. He is overseeing excavation of the site that has yielded projectile points, an apparent hearth, and what probably are bola stones. Also recovered in the excavation were wood fragments that may be tent stakes or building poles. Wooden artifacts are seldom preserved at sites of this age.

Colloquially known as the "Bolen component" of the Page-Ladson site, the late-Pleistocene strata are being investigated as part of the long-term Aucilla River Prehistory Project ("Underwater Site Details Mastodons' Life History," **Mammoth Trumpet** 10:1). Research has been in progress for more than a dozen years, and scores of Paleoindian

sites and Pleistocene-mammal sites have been discovered beneath the waters of the lower Aucilla and other rivers in northwest Florida ("Florida Archaeologists Plunge into the Past," **Mammoth Trumpet** 3:2).

The Bolen component is providing "the first step in being able to say what the people living then were doing in the

local area, and how they adapted to the rapid environmental changes that were occurring," Carter said in a telephone interview. There is little question that the changes were dramatic.

Before the end of the last Ice Age, the site—now under 15 feet of water—was part of a considerably drier landscape. It was about 100 miles from the Gulf of Mexico and the river was intermittently dry. From 10,000 to 5,000 years ago melting glaciers had brought the site to within about five miles of the Gulf by raising sea levels approximately 80 meters. The inhabitants 10,000 years ago must have watched as pine ecosystems initially gave way to thick oak forests. Scientists believe that the greatest degree of change in Florida's flora occurred at precisely that time.

The change would have deprived people of familiar resources while offering them new ones. Carter believes that the people were well enough adapted to their environment before the changes that they could easily withstand them. Environmentally initiated cultural adaptations soon followed. These Paleoindians probably became less nomadic. Carter says they settled in villages, and produced new styles of stone projectile points and a variety of new hunting and gathering instruments. Later generations ultimately turned to agriculture as a survival strategy.

Researchers believe the window presented by this site, which Carter believes





was a seasonal camp, allows them to clearly view a transition point for a culture.

"These people were the region's first humans who weren't big-game hunters," says Carter. Mammoths and mastodons, which formerly had been hunted or scavenged, vanished, so the people came to

lights for illumination. Though stained, the water is relatively clear. Excavation is time-consuming, and field workers must be competent divers. Carter, who has a master's degree in nautical archaeology from Texas A&M University, has been working at the site since 1988. His specialty is the late-Paleoindian period.

carefully teased from the surface of the paleosol and overlying clay layers.

In a layer dating to the Bolen period, team members recovered what they believe is a completed bola stone from another part of the site. Carter described it as teardrop-shaped, four to six centimeters in diameter, with a small dimple on top. It was part of a weapon of thong or cord thrown to ensnare wildlife. They also found what is probably a bola-stone preform that broke before it was finished, and another bola-stone fragment on the paleosol surface.


"It looks like this could be some kind of bola-stone manufacturing site," Carter said. Possibly bolas were being pecked to proper shape. Alternate hypotheses to these stones being for bolas could be that they were heads for maces or clubs, or perhaps hammerstones for percussion knapping of flaked stone tools.

Another interesting feature is a hearth, depressed about eight centimeters into the surrounding surface, which contained a piece of wood charred on one side but not on the other. Carter says it presumably is the same age as other materials from the Bolen surface.

Among small wooden stakes recovered was one found driven vertically through the paleosol. Carter said that stake yielded an accelerator mass spectrometry date of $8,905 \pm 65$ radiocarbon years (UA-7454). "It is difficult to say this is evidence of some kind of shelter, but my inclination is that it is some kind of structure." The stake in the paleosol was about three meters from the hearth.

The team has recovered what appear to be adzes or adze preforms, but no lithic flakes. "We are not seeing any debitage, just finished flaked and ground stone tools," Carter says. "Maybe we are seeing some new type of site that's only found in an underwater context or adjacent to a stream."

At the very least, he added, the site is providing researchers with a significant opportunity to gain new insights into a critical period of human adjustment to sweeping climatic changes.

The Aucilla River Prehistory Project has financial support from the National Geographic Society and a Florida Department of State Special Category Grant. 

—George Wisner

A white Bolen projectile shimmers in the bright lights used to penetrate the tannin-stained swamp water. Brinnen Carter captured still images of underwater subjects from Hi-8 video images made in 1995 by archaeologist Joe Latvis.



JOE LATVIS/BRINNEN S. CARTER

rely on smaller animals. Faunal materials are sparse at the site, Carter said. But fish bones and burned turtle bones are evidence of one potential shift in subsistence. And they had to adapt to changing vegetation.

"My guess is they were well attuned to those resources prior to changes and were merely shifting their emphasis to the new resources. It doesn't look to me like they really changed their essential way of interacting with the environment; they didn't simply adopt agriculture, they remained hunter-gatherer groups."

He estimates that people lived at the site for only a few generations, until rapidly rising water levels about 10,000 years ago forced them to move. Rising water also sealed the remains of their camp under a protective layer of clay that enhanced artifact preservation.

The density and amount of artifacts preserved in the Bolen component of the site is quite amazing, says Dr. David Webb, Curator for Vertebrate Paleontology at the Florida Museum and a principal investigator of the Aucilla River project.

The site is in the middle of a swamp on the west bank of the Aucilla River. Tannin in the swamp water allows daylight to penetrate only to a depth of seven or eight feet. At a depth of 15 feet, Carter says, the crew must work in "a Heart of Darkness" environment using powerful

A buried soil surface, or paleosol, is the focal point for the excavation that so far has covered about 22 square meters. The site seems to extend farther into the river's bank, but to follow it is not yet practical because it would require removal of up to five meters of overburden.

The underwater archaeologists have found side-notched Bolen projectile points, which have been stylistically dated to between 10,200 and 9,900 years ago. One piece of cypress wood recov-

"They were the first humans here who weren't big-game hunters."

ered from the Bolen level yielded a date of $10,000 \pm 80$ radiocarbon years (Beta 21750); a piece of wood in compacted soil below the paleosol's surface produced a date of $10,280 \pm 110$ radiocarbon years (Beta 21752).

Other cypress wood that may have been part of either a canoe or a large log, believed to have washed into the site after the flooding, yielded a date of $9,930 \pm 60$ radiocarbon years (Beta 58858). Carter says he has more samples to be radiocarbon dated—hickory nuts and seeds

COMING CONFERENCES

April 1-2 Annual Meeting, Human Biology Association, Adams' Mark Hotel, St. Louis.

Contact: Ralph M. Garruto, National Institute of Health, Bethesda, MD 20892. 301-846-1186. Fax 301-846-1569.

April 2-5 66th Annual Meeting, American Association of Physical Anthropologists, Adams' Mark Hotel, St. Louis.

Contact: Charles Hildebolt, Washington University. 314-362-8410. hildebolt@mirlink.wustl.edu

April 2-6 Annual Meeting, Society for American Archaeology, Opryland, Nashville TN.

Contact: SAA, 900 2nd Street NE, Suite 12, Washington, D.C. 20002. 202-789-8200.

April 17-19 50th Annual Northwest Anthropological Conference, Ellensburg, WA.

Contact: Steven Hackenberger, Dept. of Anthropology, Central Washington University, 400 E. 8th Ave., Ellensburg, WA 98926-7544. hackenbe@cwu.edu.

May 22-24 Third International Conference on Soils, Geomorphology and Archaeology, Luray, VA.

Field trips to Thunderbird Paleoindian site and several marl locations. Abstracts due Feb. 15. Contact: Joan Walker, Thunderbird Archeological Associates, 126 E High St., Woodstock, VA 22664.


Aug. 28-Sept. 3 IV International Conference on Geomorphology, Bologna, Italy.

Contact: International Conference on Geomorphology, Planning Congressi s.r.l., Via Crociali 2, I-40138 Bologna, Italy.

Oct. 20-23 Annual Meeting, Geological Society of America, Salt Lake City.

Contact: Vanessa George, Geological Society of American, 330 Pentrose Place, Boulder, CO 80301. 303-447-2020. Fax 303-447-1133.

Nov. 19-23 96th Annual Meeting, American Anthropological Association, Washington, D.C.

Contact: AAA Meetings, Dept. 4350, N Fairfax Dr. Ste. 640, Arlington, VA 22203. 703-528-1902 ext. 2. liz@aaa.mhs.compuserve.com. 

Send conference notices to Mammoth Trumpet, 37112 Moss Rock Drive, Corvallis OR 97330.



Dennis Stanford, left, of the Smithsonian institution is standing near the Big Pine Tree site's Clovis-era artifact layer, which is visible about the level of his ankles. C. Vance Haynes of the University of Arizona is standing on the upper portion of the Pleistocene terrace as it begins to slope down into the eroded flood-chute channel. Principal Investigator Albert C. Goodyear, right, stands on alluvial sand that is pre-Clovis in age.

••UPDATE••

Savannah River Quarry Site

Albert C. Goodyear, Associate Director for Research at the South Carolina Institute for Archaeology and Anthropology at the University of South Carolina, brings us up to date on work at the scientifically important Big Pine Tree site. *Mammoth Trumpet* 11:1 "Microblades Surprise South Carolina Team," reported on discoveries made during 1994 and 1995 excavations there.

THE 1996 ALLENDALE Paleoindian Expedition completed another productive season of excavation at the Big Pine Tree site near the Savannah River in Allendale County, South Carolina.

A stratified site buried by alluvium, Big Pine Tree is beside Smiths Lake Creek, a small tributary of the Savannah River. During the late Pleistocene and early Holocene, it served as a quarry and quarry-related site owing to the presence of high-quality chert available in what is now the bottom of the creek. The creek

chert source appears to have been unavailable after about 9,000 years ago. However, uplands surrounding the floodplain are crowned with the same cherts. The presence of chert locally has provided for an exceptionally rich archaeological site spanning some 11,000 years of prehistory. Allendale chert, named for the county with its abundant lithic sources, was a major raw-material type and source for Paleoindian groups in South Carolina and Georgia.

By the end of the 1996 season the archaeological sequence had become particularly well defined. Big Pine Tree excavations, sponsored by the South Carolina Institute of Archaeology and Anthropology, have encompassed an area totaling about 70 square meters. The entire prehistoric occupation, ranging from what is believed to be Clovis through early Woodland, is contained in a predictable manner within 135 cm of alluvium.

John E. Foss, soil scientist with the University of Tennessee, has developed

a detailed pedo-sedimentary sequence which has been correlated with the archaeology. Dr. Foss is the lead earth scientist on the project.

The primary interest of our excavations has been the lowest 35 cm of the site. Our excavation strategy has focused on piece plotting as many worked lithics as can be detected in the field, excavating in a grid of one-meter squares and digging in 5-cm levels. This strategy has determined the stratigraphic separation of three different occupations, which contain projectile points spanning the period from 11,000 to 9,000 years B.P. The lowest level contains many fluted blanks and preforms, thought to be related to Clovis-point manufacture. Fluted blanks like those from Big Pine Tree are common across the Southeast at quarry-related Paleoindian sites such as Thunderbird and Williamson in Virginia, Wells Creek Crater and Carson-Conn-Short in Tennessee, and the Adams site in Kentucky.

At Big Pine Tree, the lowest cultural zone is also where lithic debris is the densest. This layer resulted from primary

The Clovis level typically ranges from 115 to 130 cm below surface. Above it, from 110 to 115 cm, both Dalton points and a side-notched point called Taylor are found together. The 1996 excavation was situated over the deeper part of the site, a buried flood chute that cut into the terrace before Clovis time, probably at the end of the Pleistocene. Evidently, the terrace surface retained a depression related to the flood chute, because the archaeological sequence there is as much as 145 cm below surface.

During the last week of the 1996 season, several Paleoindian experts visited the site as excavations were open providing a full view of the profile. Diagnostic artifacts from the lower levels, such as fluted blanks, unifaces, prismatic blades, and cores, including examples of microblades, were inspected by scientists, who included David Anderson of the National Park Service; Larry Banks of Southern Methodist University; Mark Brooks, geoarchaeologist and project co-manager of the Savannah River Archaeological Research Program; C. Vance Haynes of the

Visitors touring the Big Pine Tree site listen as soil scientist John Foss and archaeologist Al Goodyear explain the site's geoarchaeology.



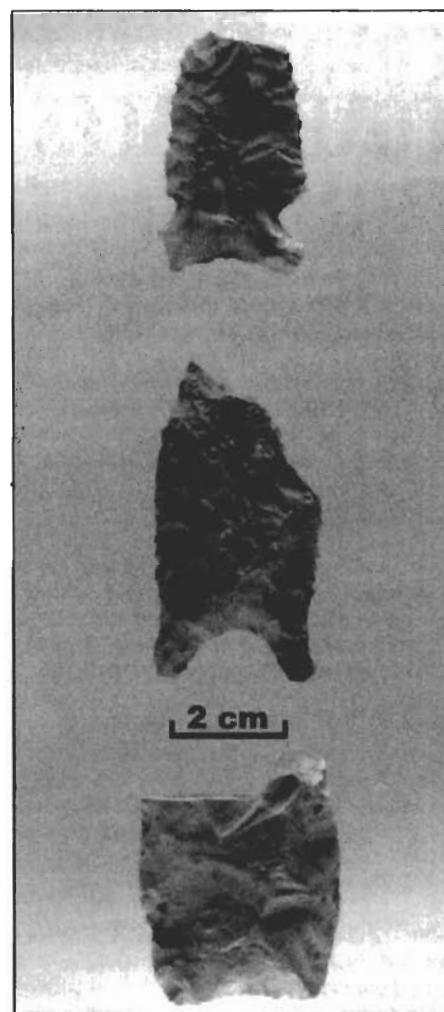
DARYL P. MILLER

core reduction and tool manufacture related to processing cobble chert procured in the adjacent creek. This artifact layer is so dense that one can readily see it in the profiles of excavation units and backhoe trenches. Statistically, the weight of lithic debris in the bottom layer is three or four times greater than in layers representing later occupations. It is clear that one of the main reasons the Clovis people occupied the site was for the exploitation of the chert source. Other stone artifacts such as endscrapers, sidescrapers, prismatic blades and even microblades are also found in the Clovis layer, indicating activities besides chert processing.


University of Arizona; Alan May of the Schiele Museum of North Carolina; Dan and Phyllis Morse of the Arkansas Archaeological Survey; Bruce Rippeteau of the South Carolina Institute of Archaeology and Anthropology; and Dennis Stanford of the Smithsonian Institution.

The Allendale Paleoindian Expedition is funded by members of the public who volunteer to take part in one week of the dig. Last year, 29 participants came from as far as Maine, Florida and Texas.

There are still openings for persons wishing to take part in the 1997 season, which will run from May 6 through May 31. There is a \$316 fee for a week of



Diagnostic projectile points of Big Pine Tree site's different depths: a Clovis preform, below; a Dalton point, center; and a Taylor side-notched point, top.

participation, \$250 of which is tax deductible. Participants help in all aspects of the excavation. Evening lectures on the archaeology of the Savannah River 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. Lunches are provided, and the evening meal is catered. Motels are available within 25 minutes of the site. The first week begins May 6, the last begins May 27. For application materials, contact Dr. Goodyear at the South Carolina Institute of Archaeology and Anthropology, 1321 Pendleton St., University of South Carolina, Columbia, SC 29208. You may phone 803-777-8170 or e-mail goodyear@garnet.cla.sc.edu. 

—Albert C. Goodyear, Ph.D.

JOSÉ LUIS LORENZO died in Mexico City in July 1996. Born in Madrid, Spain, in August 1921, he came to Mexico in 1939, as did many others, a refugee of the Spanish Civil War. His studies included a major in biology at the National Polytechnical Institute, and in 1951 he received his degree in archaeology at the National School of Anthropology. He later received his master's at the University of Mexico, where he also did his doctoral studies. In his graduate work he studied at the University of London's Institute of Archaeology and with François Bordes at the University of Bordeaux.

Lorenzo's institutional affiliation was mostly with the National Institute of Anthropology and History, where he became head of the Department of Prehistory and of the Department of Prehispanic Monuments. He was named Professor Emeritus in 1985. He taught for many years at the National School, and at the University he conducted the graduate program in anthropology.


Lorenzo's work touched several subjects, principally archaeology and geology. The importance of his work in archaeology, especially prehistory, is shown by the sites he dug and published, including Popocatepetl, Yanhuitlan, Tepexpan, Teopisca and Tlapacoya. His work testifies to his interest in the peopling of the Americas. In geology—Quaternary research, especially in glaciology—he was a recognized authority, and contributed many papers on specific problems and on general concepts. Some of his studies will be quoted for many years. After a youthful affection for hiking, mountain climbing and diving, Lorenzo's archaeology reflected his experiences and his way of looking at his profession. Reflecting his contacts with F. E. Zeuner's work in London, and the teachings of Pedro Armillas, certainly one of his mentors, he was very concerned with the relation of archaeology with the natural sciences. He succeeded in establishing a series of laboratories at the department of prehistory that included botany, zoology, chemistry, and petrography. Lorenzo's experience in prehistoric sites in Europe, especially with Bordes, was reflected in

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JOSÉ LUIS LORENZO

Mexican Prehistorian

1921–1996

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DENISE SINS/NEVADA STATE MUSEUM



*The Spirit Cave mummy
as it may have appeared to
Georgia and S. M. Wheeler.*

Spirit Cave

continued from page 1

early Nevadan." Underneath this carefully made bag of remains lay irrefutable proof of what they were hoping to find. Humans *had* been there in the ancient past.

"Immediately under this was another large mat of tules, the warp held together with rows of tule twining about five inches apart." They enlarged their pit to uncover the complete mat and they saw they had a second burial that was a much more significant discovery than the first. "The wrappings were nearly perfect." Their excavation turned out to be six feet long, four feet wide, and more than three feet deep.

"It was lined with sagebrush on which the mortuary bundle was deposited, and then covered with more brush." They found the head of the burial at a depth of two feet, four inches, slightly higher than the hips. "The upper part of the pit had been filled with rocks, which the wind eventually concealed with fine sand." The intrusive upper burial had been laid onto the covering of the earlier one.

Excellent State of Preservation

The lower burial was intact and in an excellent state of preservation. The upper part of the body actually was partly mummified; some hair and scalp remained on the head, and its leather moccasins, rabbit-skin blanket, and burial mats were in good condition. The person had been placed on his left side with his knees flexed upward to the level of his hips.

The Wheelers carefully excavated and removed the mummy, designated as Burial 2, and then faced the problem of getting this precious treasure back to their station wagon. "With the assistance of Fallon residents, we were able to accomplish this without doing any damage to the specimen," Wheeler reported.

Not long afterward, they learned disappointing news about the apparent age of the individual. M. R. Harrington, curator of the Southwest Museum, placed the age of the burial at approximately 1,500 to 2,000 years. Burial 2 could not have dated to the

time Lake Lahontan was drying up. Thus they did not have verification that people had lived beside the Pleistocene lake.

Awaiting Radiocarbon Dating

Because their discovery was made in 1940, the archaeologists had to accept expert opinion—the advent of radiocarbon dating was still more than a decade away.

The mummy was placed in a well-crafted wooden box. Cataloged and curated in the security of the Nevada State Museum in Carson City, it remained awaiting the proper time for study as part of the long-term project on Lahontan Basin prehistory.

That time came when R. Ervin Taylor of University of California Riverside Radiocarbon Laboratory began experiments to determine if it is feasible to date hairs recovered from archaeological sites. Dr. Taylor contacted Donald R. Tuohy at the Nevada State Museum to ask if the museum had any mummies with hair on their heads. Assured that such samples were available, Taylor went to Carson City to obtain the hairs and take bone samples selected by the museum staff to test procedures and results.

One of the mummies Taylor took samples from was the Wheelers' Burial 2, presumed about 2,000 years old. The testing procedure called for taking a small sample of bone to date in comparison with the date obtained from a hair. Curiously, Taylor's lab got results indicating Burial 2 dated to the early Holocene, more than 9,000 years ago. Had something gone wrong? Taylor and his lab colleagues at UC-Riverside decided to investigate further.

After conferring with the Nevada State Museum's Tuohy and Amy Dansie, they decided to see if the woven mats also would yield dates as old as had hair and bone samples. It was not a straightforward task because the mats had been kept preserved with mothballs for more than half a century. To get an accurate date from the plant materials, the naphthalene would have to be removed from samples. Richard Burky, a student in Taylor's lab, proposed treating the mats as they had the bone and the hair—a complex, technical procedure in which the amino acids were extracted, then dated by accelerator mass spectrometry, or AMS.

The Wheelers HAD Succeeded

Dates from samples of the two burial mats were almost identical to dates for hair and bone. The Wheelers *had* found proof that people had lived beside Lake Lahontan as it was disappearing. Mr. Wheeler did not live to learn the true age of the discovery, but his wife did.

Dansie, anthropologist at the Nevada State Museum, talked with Georgia about the new dates that confirmed the Wheelers' initial belief that the burial was quite old. "She wasn't surprised," said Dansie.

Knowledge that Spirit Cave Burial 2 was one of the oldest sets of human remains in North America (to say nothing of its being the most complete and well preserved) brought renewed scientific focus on this early Nevadan. Physical anthropologists from the Smithsonian Institution have visited the Nevada State Museum to analyze the skeleton as has D. Gentry Steele of Texas A&M University, who has made detailed studies on paleo-

American skeletal remains. Details of these studies have yet to be published, but preliminary results will be published in the *Nevada Historical Society Quarterly* this year.

Wizard's Beach Man

The surprising date for the Spirit Cave man was discovered about the same time the Nevada State Museum learned that another skeleton in its collection dated to almost exactly the same era. The other early-Holocene skeleton, known as the Wizard's Beach man, was found in 1978 when a prolonged drought had lowered the level of Pyramid Lake northeast of Reno. The discovery site is only about 100 miles from Spirit Cave. Though scientific details have not been published on the Wizard's Beach man, radiocarbon dating has established that he lived more than 9,200 years ago. Because the skeleton was discovered when Pyramid Lake was lower than it had been in historic times, Dansie says he likely died at a time of severe drought. "We're very interested in trying to understand the details of that climate change," said Dansie.

Dansie and other scientists are excited about the potential these two skeletons and the associated sites offer the study of human adaptation to changing climate. They date to the period when Ice Age environments, which created great inland lakes such as Lahontan, were giving way to the altithermal, the period of maximum temperatures when lakes were drying up or shrinking to the remnants, such as Pyramid Lake, that we know today. It was a time when people were adapting to new lifestyles that included the harvesting and grinding of seeds for food to supplant diets of fish and meat. One significant question these early skeletons address is when and how seed grinding was added to the human adaptations during the early Holocene.

Different from Later People

These two early Nevada men looked somewhat different from most of the people who are known to have inhabited the area about 5,000 years later. Possibly they represent a population that reached North America before other ancestors of today's



Nevada State Museum anthropologist Amy Dansie, center, shows visiting scientists the carefully woven matting that served as a shroud for the Spirit Cave mummy. At the left are Parvene Hamzavi and Shannon Novak, part of the Smithsonian Institution's physical anthropology team; at the right is Richard Jantz, University of Tennessee anthropologist.

Native Americans. Analysis of cranial measurements of skeletons that date to around 9,000 years ago or earlier indicates those people had different morphologies and may have had different roots than later Americans. Forensic anthropologists, expert at determining the physical characteristics of crime and accident victims, say these most-ancient Americans had certain generalized features they see in contemporary Caucasian populations.

Does that mean the first Americans, including the man buried in Spirit Cave and the one whose remains were found beside Pyramid Lake, had European ancestors? Not likely, according to human morphologists, scientists who study change that has occurred over time to human skulls. For example, Dr. Steele's careful analysis of rare paleo-American skeletons has revealed statistical similarities to some modern Asian, Pacific and European populations. Marta Mirazon Lahr and Walter Neves, specialists in human diversity of ancient South Americans, agree that the earliest American skeletons lack some of the specific features that define modern ones. (See "Who Were the First Americans?" *Mammoth Trumpet* 11:3 and 11:4; "Brazilian Scientists Challenge 3-Wave Theory of Migration," *MT* 11:3; and "Paleoindian Skeletal Data Re-examined" *MT* 7:2.)

Dansie believes the two ancient Nevada skeletons exemplify the interrelatedness of humans. "These skeletons are important to remind everybody that we are all of one people," she says. However, she points out that the physical appearance of later peoples in that part of the Great Basin actually was quite different from the early ones. "There's no reason to think they are ancestral to Paiute people," she says. Even Paiute legends say that they were victorious over people who occupied the area

THE DATES

Seven dates obtained from Spirit Cave Burial 2 produced a weighted mean of $9,415 \pm 25$ years B.P. The individual dates:

hair	$9,360 \pm 60$ (CAMS 12354)
hair	$9,350 \pm 70$ (CAMS 12353)
hair	$9,440 \pm 60$ (CAMS 14224)
bone	$9,430 \pm 60$ (CAMS 12352)
twined tule mat	$9,410 \pm 60$ (CAMS 24192)
twined tule mat	$9,460 \pm 60$ (CAMS 24197)
diamond-plaited mat	$9,430 \pm 70$ (CAMS 24199)
Burial 1 (above mummy)	$9,270 \pm 60$ (UCR 3480)
twined hemp bag,	
Cremation 2	$9,040 \pm 50$ (UCR 3478)



This close-up shows details of the diamond-plaited matting that wrapped the Spirit Cave mummy. Visible are the plain weave, paired cordage wefts, and the diamond-shaped warps formed by packing the carefully split tule between the wefts. Authorities say it is essentially a newly discovered textile in the New World.

when Paiutes first arrived. "Their own stories say that they eliminated their predecessors."

Whoever the Spirit Cave man and the Wizard's Beach man were, their skeletons show obvious similarities. Both had long narrow faces, unlike the relatively wider and shorter faces character-

istic of early Native American people. They both died at approximately the same age—45 years. They may have been exact contemporaries, but because radiocarbon dating isn't precise enough to say, hundreds of years could have separated their time on earth.

The Spirit Cave man was only five

feet, two inches tall. He had two abscessed teeth at the time of his death. These abscesses, according to physical anthropologists who have examined the skeleton, could have been the immediate cause of death; there was a severe infection in both his upper and his lower jaw. However, he also had a skull fracture that was just beginning to heal.

Some of Skeleton Lost to Lake

Though the Spirit Cave man's skeleton was completely preserved, about half of the Wizard's Beach man's bones were lost to Pyramid Lake's wave action. The bones, however, are clear evidence that he was a healthier, more robust man than the Spirit Cave man. Dansie suggests that they may be from two different groups; the robust man having a diet that included more fish and meat than stone-ground seeds. The Wizard's Beach man had very healthy teeth. Though they exhibit considerable wear consistent with his age, the wear was gradual and lost dentin had been replaced, unlike teeth found in all later seed-eating people.

The Wizard's Beach man impressed physical anthropologists who analyzed his bones. "He was a big guy," said one. "Obviously lots of protein in his diet." His stature in life was calculated at five feet, six inches tall. Another anthropologist described the bones as large and dense. The scientists know that he was a vigorous, well-muscled man, but they don't know why he died.

CRAFTWORK FROM SPIRIT CAVE

The fiber artifacts recovered from Spirit Cave included a miniature coiled basket fragment, the two cremation bags, and the mats that wrapped the mummy. The cremation bags include an outer bag of diamond-plaited matting and an inner twined, fringed, hemp-cordage bag. The bags were found resting one on top of the other.

The mummy's outer covering was a twined tule mat beneath which was a much more intricate diamond-plaited mat. He was wearing a twisted skin robe, still retaining some hair, that was tied with a fur belt. On his feet were moccasins, each made of three pieces of hide—a sole, a side piece and an ankle wrap—carefully sewn together with a running stitch and a blanket stitch of sinew and cordage. Archaeologist Amy Dansie of the Nevada State Museum says the moccasins appear different in style from any known in the Great Basin.

Dansie says that though the mummy's twined tule mat outer wrap looks like mats that were widely used in the western Great Basin until recent times, authorities have observed that the plaiting was done in reverse direction from similar mats made by Paiute peoples. The finer, diamond-plaited mat was made with two-ply, Z-twist hemp cordage with sagebrush mixed in, and plaited tule.



Leather moccasins from the Spirit Cave mummy, showing their complex construction.

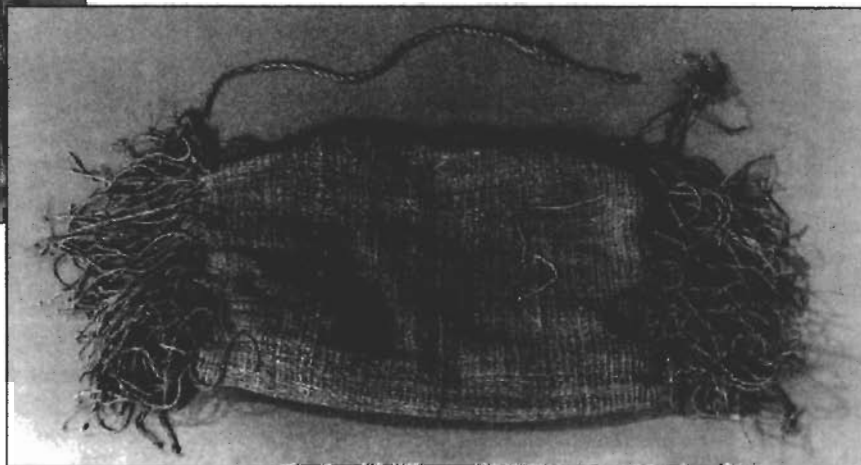
SCOTT KLETTE/NEVADA STATE MUSEUM

SCOTT KLETTE/NEVADA STATE MUSEUM



This fringed bag of close-twined hemp and sagebrush cordage was the interior bag of Cremation 2. The fine hand-weaving is as technically advanced as any later weaving in the Great Basin, but is not duplicated in later styles. Including fringes, the bag is about 50 cm wide.

Cremation 2 (left), a bag of plain weave, split-tule warp with hemp cordage weft, from Spirit Cave, was one of two cremations that were stacked together. This bag, about 38 cm wide and 20 cm deep, contained the fringed bag below and the thoroughly cremated remains of an adult female human.



BOTH: SCOTT KLETTE/NEVADA STATE MUSEUM

Little can be known about the other individuals buried in Spirit Cave. The Wheelers had returned to the site on Aug. 16 and did some additional excavations. Against the rear wall about 10 feet away from the previous excavation she found what her husband described as a "small, unshaped metate" 20 inches below the surface. Not far below that, she uncovered a small twined bag of split tules and immediately below that a close-twined bag of native hemp. Both bags contained burnt fragments of human bones. Assuming that each contained the remains of one person, S.M. Wheeler suspected that they had been cremated in the cave, but he noted that all trace of the crematory fire had disappeared from ceiling and walls. Both bags, he said, had definitely been buried at the same time in the end of a trench marked by charcoal, ash, and small bone fragments. Recent radiocarbon dates by AMS place the age of the cremations at $9,040 \pm 50$ years ago (UCR 3478)—375 years after the mummy. Subsequent analysis revealed the remains of two additional individuals in the cave.

Spirit Cave is at an elevation of 4,154 feet in the foothills of the Stillwater Mountains. It is about 211 feet below the last high level of Lake Lahontan, which is at an elevation of about 4,365 feet. The level of Pyramid Lake is now about 3,790 feet in elevation.

The Wheelers recovered 66 artifacts

from Spirit Cave, most of which were fiber and fur materials associated with Burial 2. They discovered what would prove to be the remains of five individuals, but they found only seven lithic artifacts including a Humboldt point, known in the Great Basin to date to the period from 9,000 to 7,000 years ago. Analysis of the textiles on the mummy and one of the cremation bags reveals that the weave is not twining, but a distinctive plain weave dubbed "diamond plaiting" by museum staff. Dansie says it is a major new textile type in the New World, found only in the ancient Northwestern Great Basin. This particu-

lar weave was not recognized as an early Great Basin textile type until the dating of the Spirit Cave mummy, wrapped in the same kind of textile, drew attention to its significance.

Paiute tribes have asked the Nevada State Museum to turn over to them the two ancient skeletons, now listed as unidentified in the official Native American Graves Protection and Repatriation Act (NAGPRA) inventory. Ultimate disposition of the skeletons must await clarification of NAGPRA's application to "ancient" remains such as these. 🍷

—Don Alan Hall

Those Cryptic Numbers

Unless technology fails us, which it sometimes does, we print membership expiration dates above the addresses of all **Mammoth Trumpet** mailing labels. The date shows the month *before* the date of your last issue of the **Mammoth Trumpet**—"3/1/96," for example, means that this April 1997 issue is your last; "6/1/97" means that your subscription still includes the April and July issues.

To simplify our membership database, each membership is dated to one of four months, December, March, June and September. (A few years ago we tried having all memberships begin in

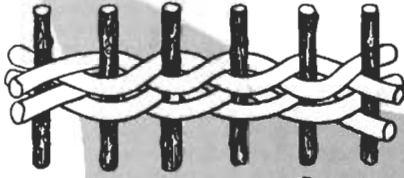
either June or December, but that streamlining experiment caused problems we'd rather forget about.) We try to send reminders to expiring memberships every three months, but we've been known to get involved with other projects and forget to do so.

The seven-digit number above your address is your personal number that helps us find your records when you renew, move, or order a book. Please include that number if you send us a change of address. Your membership is vital to our operations, and we do so much appreciate those of you who renew before we send a reminder. 🍷

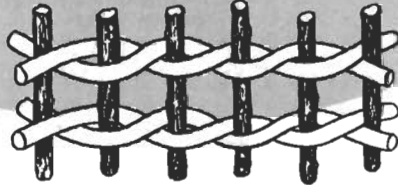


Four types of simple weaving

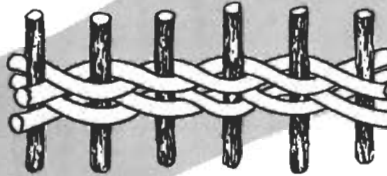
Close simple twining, S-twist wefts



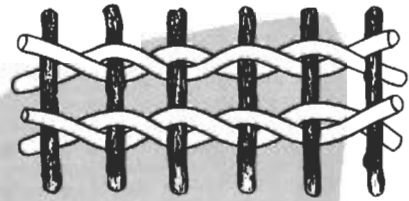
Open simple twining,
s-twist wefts



Close simple twining, Z-twist wefts



Open simple twining,
Z-twist wefts



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MANY ARCHAEOLOGISTS are proficient in analyzing ancient stone tools, but only a handful have developed expertise to analyze perishable-fiber artifacts. And James M. Adovasio, Director of Mercyhurst Archaeological Institute, Erie, Pennsylvania, argues that perishable fiber—cordage, basketry, cloth and the like—can tell us more about the people who made them than most archaeologists realize.

Dr. Adovasio, a recognized authority on perishable fiber, believes that over the years archaeologists have tended to place undue emphasis upon durable artifacts such as stone tools as opposed to perishable-fiber materials. The emphasis on lithic materials has occurred in spite of the fact that most sites from which perishables have been recovered yield far more fiber material than stone or bone. Adovasio says archaeologist Walter Taylor once calculated, based on his excavations of early sites in northern Mexico, that for every single stone tool that he recovered there were six tools made of wood or bone and 26 items made out of fiber.

Why have so few archaeologists chosen to specialize in the analysis of fiber artifacts? Adovasio thinks that the theoretical focus exemplified by Lewis Binford in the early 1960s led archaeologists away from material culture studies of any kind, even lithics.

"An emphasis was placed on the construction and testing of elegant theoretical constructs and hypothesis," Adovasio said in a recent telephone

interview. "You ended up with a generation or two of theoretically elegant scholars who not only couldn't excavate their way out of a paper bag, but could not analyze the contents of the site that they recovered because of a gross unfamiliarity with the nature of the repertoire of materials they were getting."

Another reason fiber has received less attention than lithics is that though it is relatively easy to learn the rudiments of analyzing fiber, examining collections takes a great deal of time. Authorities place a considerable premium on examining many collections and knowing where materials in various collections fit into a broader perspective. Adovasio says most archaeologists can't afford the time or the money it would take, so they send their perishables to experts for analysis.

Archaeologists May Overlook Value of Fiber Artifacts

Adovasio himself had no intention of becoming immersed in cordage, basketry, and assorted woven products when he first began his archaeological schooling. But during graduate work at the University of Utah in the late 1960s, archaeologist C. Melvin Aikens, now at the University of Oregon, assigned Adovasio to analyze the perishable materials from Hogup Cave.

The work became the basis for Adovasio's dissertation research, later broadened to include analysis or reanalysis of all the major institutional North American fiber collections in the United States. After his dissertation on the evolution of basketry production in the prehistoric Great Basin, Adovasio began to look at similar material throughout the world and to develop a comprehensive database.

From 1973 through 1990 he worked to develop the Perishables Analysis Facility at the University of Pittsburgh, which was involved in analyzing fiber collections from all over the United States. In 1990 Adovasio moved the entire operation to Mercyhurst College, where he set up an archaeological institute aimed at doing high-tech research in a small-college setting, with one focal point being the analysis of fiber artifacts.

Adovasio says Paleoindians are usually thought of "as big-game hunters leading a lifeway built around durable weaponry which is involved in the taking of medium- to large-sized animals. Or at least that is one of the most dramatic facets of the lifeway. It is also equally apparent that these same populations are manufacturing nets and capturing a

things, "like standing in front of a mammoth with a spear-thrower in your hand and attempting to figure out how to get a Clovis or a Folsom point stuck into the side of the critter without getting trampled." It is also important to remember that the Paleoindians worked in wood and in hide. "The be-all and end-all of their lives is not stone!"

Adovasio has developed a terminology for basketry based upon some prior systems with additions of his own. His book, *Basketry Technology*, is the standard reference for North American basketry. In the terminology that Adovasio has developed, "perishables" refers to a broad category of products made through a basketry or textile-manufacturing process. Basketry includes rigid and semi-rigid containers, matting and bags.

mats, bags, as well as fish traps, cradles, hats, seed beaters, etc. Twining can also be used to make cloth for blankets, sashes and various garments.

Coiling is a basket weave made by sewing stationary, horizontal elements (the foundation) with moving, vertical elements (stitches). He says that coiling techniques are used almost exclusively to produce containers and sometimes hats. Coiling is very rarely used to make bags, mats, etc. He notes that cloth fabrics are never produced by this method.

Plaiting is a basket weave in which all elements interlace—pass over and under each other—without engaging. Plaited basketry is thus described as unsewn. Adovasio says plaiting can be used to make containers, bags, mats, and sandals. Simple plaiting on a frame or

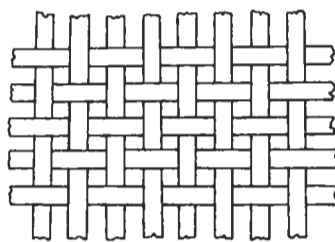
Ancient Hunters Utilized More Than Stone Tools, Adovasio Argues

wide variety of game with those nets." Discovery of large, big-game-hunting nets from Paleoindian context in western North America provided him interesting glimmers of the importance of perishable-fiber artifacts to early Americans.

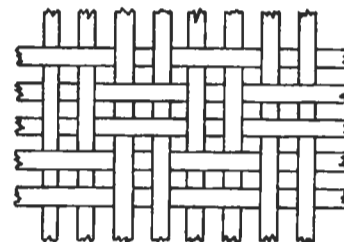
"And we are now getting glimmers from the European Upper Paleolithic that suggest that this monolithic view of Paleoindian or Upper Paleolithic economy is purely specious. There are other ways of acquiring and processing protein and other plant and animal products that involve perishable technology to an extent as least as great as the stone tools, the atlatls, the bows and arrows, and other items by which we tend to identify their food-gathering activities.

"By appreciating the importance of fiber technology during the Paleoindian period specifically, I think one can better understand what it is these folks are actually doing.

Adovasio suggests that rather than exclusively focusing on more dramatic



One element per set

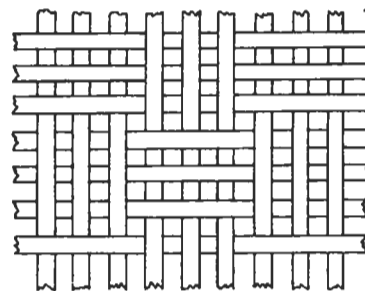


Two elements per set

Examples of simple plaiting at a 1/1 interval

Matting is two-dimensional or flat, while baskets are three-dimensional. Bags are intermediate forms: two-dimensional when empty, three-dimensional when filled. All forms of basketry are woven manually without the use of a frame or loom while textiles are cloth fabrics that are made on or with the aid of a frame or loom. Cordage, a category of perishable artifacts commonly referred to as string or rope, is constructed from elongate fibers spun and twisted together. It is considered to be separate from basketry and is thought to be a precursor of twining.

Of the three major types of basketry, Adovasio says it is twining that always shows up first chronologically. Twining is a basket weave made by passing moving (active), horizontal elements called wefts around (stationary) passive elements called warps. Using twining techniques, one can produce containers,



Three elements per set

loom results in cloth fabrics or textiles known as plain weaves. Any systematic variation of the interlacing interval produces a variety known as float weave.

Miscellaneous perishables is a category that fits neither into cordage nor basketry. It includes items ranging from simple fiber bundles to sewn leather bags, prayer-feather holders, and knotted netting.

Adovasio believes that twining technology is at the base of virtually all prehistoric basketry and textile production throughout the world with the possible

exception of eastern North America, where plaiting has an equally ancient history.

The oldest fiber technology in the world recovered thus far was recorded as impressions in clay and comes from Pavlov I in the Czech Republic dating between about 24,000 and 27,000 B.P. The next oldest fiber artifacts include fragments of charred cordage or netting from Mezhirich in Ukraine and Kosoutsy in Moldova dating from around 17,000 B.P. Also of broadly comparable age are charred cordage fragments and impressions on clay from Lascaux, France.

Slightly older cordage has recently been reported from Ohalo II on the Sea of Galilee, though elsewhere in the Near East the use of fiber technology is not well documented before Natufian or early-Neolithic contexts. With the exception of the Ohalo II materials, according to Adovasio, none of the recovered perishable items is older than about 8,000 or 9,000 years.

The oldest evidence of fiber artifact production from Asia,

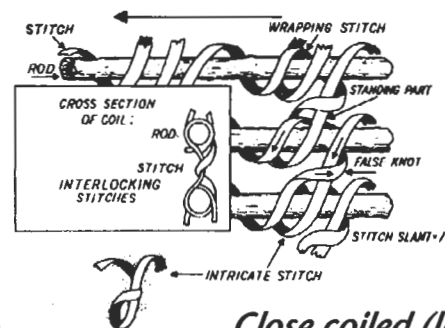
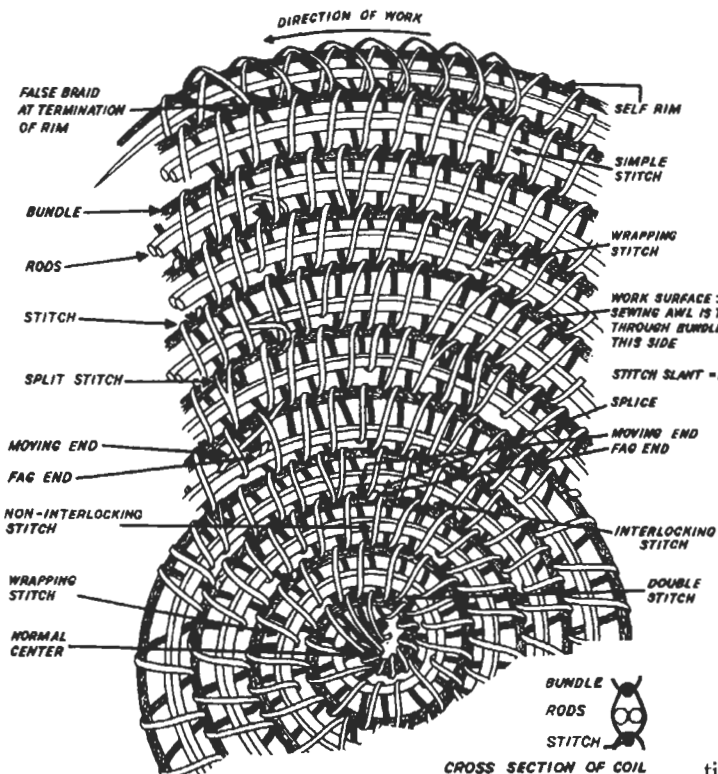
fiber artifacts older than 11,000 B.P. can literally be counted on the fingers of one hand.

Simple plaited basketry fragments from Meadowcroft Rockshelter, Pennsylvania, date from 12,800 ± 870 B.P. to 11,300 ± 700 B.P., and are presently the oldest fiber perishables recovered in the eastern United States.

An open-twined, Z-twist, weft mat fragment from Fishbone Cave, Nevada, was directly assayed and given a date of 11,250 B.P. This specimen is, at the moment, the oldest directly dated perishable-fiber artifact in western North America.

Danger Cave in Utah has yielded the oldest cordage and netting from the eastern Great Basin with three specimens that date from 11,151 ± 570 B.P. to 10,270 ± 650 B.P.

Fort Rock Cave in Oregon has yielded cordage, sandals and simple twined basketry with Z-twist wefts. Though the age of the basal deposits at Fort Rock remains controversial, Adovasio says the perishable specimens are at least 11,000 years old. Also



Close coiled (left) and open coiled basketry

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including late Pleistocene/upper Paleolithic and so-called "Mesolithic" sites in China and Japan, is presently no older than 13,000 to 12,000 years B.P.

No basketry, textiles or cordage of relatively comparable age is presently known from Africa or Australia. In South America, textiles and basketry are found in the Peruvian highlands dating from the early 10th millennium B.P., says Adovasio. The Monte Verde site in Chile, dated at around 13,000 years ago, is believed to be one of the most convincing cases for early humans in the New World, and is certainly the most convincing case from South America, says Adovasio.

In both east and west North America, the oldest basketry, textile or cordage material is more than 11,000 years old, though very few specimens have been recovered in well-dated contexts. Adovasio says North American sites with perishable-

controversial are cordage and knotted netting materials from presumed Clovis contexts in Pendejo Cave, New Mexico. Although they have not been directly assayed, they may date to between 11,900 B.P. and 11,300 B.P., thus making them the oldest perishable assemblage in western North America.

The idiosyncratic nature of basketry makes it possible to identify individual weavers. "The transmission of craft-based knowledge with fibers is from mentor to student in a very close, usually familial, relationship," says Adovasio. "Unlike most other classes of items, the production of textiles, basketry, and cordage is a very standardized thing culturally, so that it is possible to recognize ethnic affiliations, cultural boundaries and cultural relationships in perishable items that you simply can't do with lithics and you can do less precisely with ceramics." It is even possible to separate the products of culturally and linguistically disparate groups of basket makers.

Adovasio has done extensive attribute-oriented comparative studies of extant prehistoric basketry from all parts of the Great Basin. He postulates three regional prehistoric basketry manufacturing areas within the Great Basin: the Northern, Western, and Eastern Basin centers. These centers do not relate to specific tribes or language families but rather to shared technologies presumably rooted in environmentally determined adaptive strategies that cut across many different ethnic units.

—Carol Ann Lysek