

# MAMMOTH TRUMPET



Volume 10, Number 3  
July, 1995

Center for the Study of the First Americans  
Oregon State University, Corvallis, OR 97331

Department of Anthropology  
ISSN 8755-6898

## STONE-TOOL TRADITION ENDURES RADICAL ENVIRONMENTAL CHANGE

### Delicate Points May Not Have Been Practical

Careful analysis of projectile points from early sites on the Peruvian coast provides evidence of environmental change as well as testimony to the endurance of specific tool-making traditions. French scientists who are analyzing vestiges of the earliest-known culture there have documented a bifacial lithic-point tradition so strong that it continued even when simpler tools would have been more practical. The scientists suggest that the delicate and intricate bifacial points may have been status symbols.

Claude Chauchat of Bordeaux University's Quaternary Institute has been studying Peru's early hunter-gatherers including the earliest-known people, the Paijánense, for about 20 years. With colleagues in the Cupisnique French Archaeological Project, he has analyzed changes in climate, excavated burials, examined faunal remains from dwelling areas, and conducted extensive studies of the distinctive Paiján projectile points including a painstaking replication program. These archaeological sites in one of the western hemisphere's driest places have yielded evidence that the Paijánense adapted from inland to coastal resources as drought gripped the land and the level of the sea rose.

Dr. Chauchat and colleague Jacques

Pelegrin, a widely respected lithic expert and flintknapper, are now able to compare material left behind in Paiján workshops with material produced by their own experimental flintknapping. In one carefully controlled project, Dr. Pelegrin experimentally replicated 13 Paiján points, ascertaining the technical difficulty and evaluating the know-how required to make such multi-stage creations compared with that needed for production of other types of tools the Paiján people possessed or might have used [article page 6].

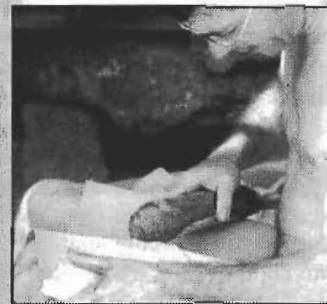


Chauchat argues that the beautiful Paiján points are evidence in themselves that their makers were adapting to the disappearance of once-plentiful land mammals at the end of the Pleistocene about 10,000 years ago. The desert near Peru's coast north of Lima has revealed remains of a variety of Pleistocene mammals including edentates—the anteaters, armadillos and sloths—proboscideans such as *haplomastodon*, horses, and llamas. However, the campsites of Paiján hunter-gatherers excavated by Chauchat and his colleagues have contained only the remains of land snails, fish and lizards. There were also bones of small mammals and birds, but there is no indication that the Paijánense had

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## ARTICLE BY CSFA LEADERS DESCRIBES EFFECTS OF ACT

New laws often have unforeseen consequences, and so it has proven with the Native American Graves Protection and Repatriation Act (NAGPRA). Robson Bonnicksen, Director of the **Center for the Study of the First Americans**, and Alan L. Schneider, vice-chair of the CSFA Advisory Board, explain in an article appearing in the May-June issue of *The Sciences*, magazine of the New York Academy of Sciences, how NAGPRA has halted scientific research contrary to the original intent of Congress.

Because some Native Americans believe that the provisions of the Act apply to naturally shed human hair, the CSFA's Mammoth Meadow archaeological site in southwest Montana has been shut down since 1993. The article, titled "Roots," details the predicament facing scientists who wish to analyze hairs from archaeological sites in the United States.

After Marvin T. Beatty, soil scientist with the CSFA research team, devised a method to separate hairs from earth being excavated at Mammoth Meadow, many individual strands of hair were recovered. Most had belonged to animals, but some were from humans. Though Mammoth Meadow excavations have uncovered no human burials, tribal groups have demanded repatriation of all human hair from the site. The article notes that people naturally shed as many as four million hairs in a lifetime.


Until the Native Americans' claim is settled, the federal Bureau of Land Management, administrator of land on which the site is located, has halted excavation and forbidden research on all hair recovered there. Bonnicksen and Schneider point out that people who shed hairs found in the site's lower levels are more than 550 generations removed from Native Americans who now live in the region. Perhaps, they say, these modern people may be related to the ones who shed the hair, "but unless we are allowed to date and study the hair, no one will know. The very law intended to protect a people's feeling for their past may prevent that past from being recovered." Bonnicksen and Schneider have pro-

posed that the definition of human remains under NAGPRA be clarified to exclude naturally shed hair (**Mammoth Trumpet** 10:1).

Their article includes an up-to-date review of First Americans research and the scientific controversies that have surrounded it from the days when Aleš Hrdlička of the National Museum of Natural History declared that people had been in the Americas for no more than 3,000 years. Though this time frame has been expanded to more than 11,000 years, controversy continues with not all scientists accepting the long-favored Clovis-first theory. Research on DNA might provide evidence to resolve this controversy—evidence that could be as startling as was the discovery of a projectile point in the rib of a long-extinct animal. As well as being dated, naturally

shed hair also offers a potential source of DNA for First Americans studies.

Bonnicksen and Schneider conclude by saying that Congress did not intend for NAGPRA to carve up American prehistory and history into a multitude of separate segments reserving certain periods for certain ethnic groups. "The intent was to ensure that the first Americans would be treated with the same respect accorded any other ancestor of Americans alive today. By helping to describe the first Americans in detail for the first time, studies of ancient hair would only heighten that respect."

Since the publication of *The Sciences* article, Bonnicksen has traveled to Montana to meet with representatives of the groups that requested repatriation of human hair from the Mammoth Meadow site. While the meeting did not result in an immediate agreement on disposition of the hair, Bonnicksen characterized it as friendly and productive. It is hoped that further meetings will follow. 

—DAH



**The Mammoth Trumpet** (ISSN 8755-6898) is published quarterly by the **Center for the Study of the First Americans**, Department of Anthropology, Oregon State University, Corvallis, OR 97331-6510. Second-class postage paid at Corvallis, OR 97333.

POSTMASTER: Send address changes to:

**Mammoth Trumpet**

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

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C & C Wordsmiths	Layout and Design

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# Interpreting NAGPRA

After President George Bush signed the Native American Graves Protection and Repatriation Act into law in 1990, it was necessary to establish a committee to administer the act. The Secretary of the Interior spelled out the committee's responsibilities in 1991, and then nominations for the committee were sought through a notice in the *Federal Register*.


The Act required that nominations come from Indian tribes, Alaska Native villages and corporations, Native Hawaiian organizations, and national museums and scientific organizations. More than 50 nominations were received and from that list former Interior Secretary Manuel Lujan appointed six persons, three from Native groups and three from scientific

establishments. Named were Rachel Craig, Inupiaq; Dan Moore, Peabody & Essex Museum; Tessie Naranjo, Santa Clara Pueblo; Martin Sullivan, Heard Museum; William Tallbull, Northern Cheyenne, and Phillip Walker, University of California, Santa Barbara.

Lujan told the appointees: "The committee faces a challenging set of tasks, ranging from advising me on the regulations needed for implementing the statute to assisting in the resolution of disputes caused by its requirements." At its initial meeting in 1992 the committee set about recruiting a seventh member, and soon Jonathan Haas of the Field Museum was the members' unanimous choice. C. Timothy McKeown, NAGPRA program leader, says that the committee operates quite differently than what one might expect of a federal government advisory body.

"The group acts by consensus, with the only formal vote being a unanimous decision at the first meeting to dispense with *Roberts Rules of Order*. Several members have described the committee as a second family," McKeown wrote in an article in the Fall/Winter 1995 issue of *Federal Archeology*.

The NAGPRA committee has met eight times; meetings usually last three days. Members have already heard some difficult disputes. For example, at last November's meeting in Albany, N.Y., there was the case of the U.S. Marine Corps, which was ready to repatriate 1,500 sets of remains. The problem was that 15 different parties had made claim to them. The committee's recommendation: the Marines will retain the remains until the claimants agree on a compromise position. Undoubtedly there will be more disputes to settle.

NAGPRA itself is law; the committee's job is to clarify the law whenever necessary. McKeown points out that there also are governmental rules regulating rule making and that the interpretations can't contradict the Constitution. Ambiguities must be analyzed in the context of legislative history, and new or specific law supersedes old or general law. 

## Thoughts on Two Worldviews

*Tessie Naranjo of Española, N.M., has been chair of the NAGPRA Advisory Committee since 1992. She describes her experience in the following article first published in Federal Archeology. We reprint it with her permission.*

One fall day in 1991, I received an unexpected phone call from Dr. Francis P. McManamon, chief of the archaeological assistance division of the National Park Service. Dr. McManamon introduced himself and began to ask a few questions. Given the reason for his call, I responded in detail.

Several weeks before, the governor of Santa Clara Pueblo had received a letter requesting applications for a position on the review committee for the Native American Graves Protection and Repatriation Act. This letter was forwarded to my office—the Santa Clara cultural preservation program—along with a request from the governor that I respond.

I sent the necessary paperwork and was surprised when Dr. McManamon called requesting additional information. After several questions about my role in the community, he asked if I would be willing to serve a five-year term on the committee. I said yes. My world has changed dramatically since that day.

In the course of my involvement with NAGPRA, I have read the statute many, many times. I have had the opportunity to discuss its meaning with a wide range of both traditional Native Americans

and non-tribal people. One thing that has struck me is how differently these two groups define relationships.

Traditional Native Americans believe that everyone and everything exist in an integrated and pervasive system of relationships. One resident of Santa Clara Pueblo put it this way: "We are part of an organic world in which interrelationships at all levels of life are honored: Our relations to the place we live—the land, water, sky, mountains, rocks, animals, plants—is tangible. Our sense of social relationships leads us to respect all who have gone before and all who will follow, our elders as well as our youth."

Traditional Native Americans see an essential relationship between humans and the objects they create. A pot is not just a pot. In our community, the pots we create are seen as vital, breathing entities that must be respected as all other living things. Respect of all life elements—rocks, trees, clay—is necessary because we understand our inseparable relationship with every part of our world.

This is why we honor our ancestors and the objects they created. This honoring allows us to remember our past and the natural process of transformation—of breathing, living, dying, and becoming one with the natural world. Not even in death are we unrelated.

My understanding of relationships has been hard to reconcile with the non-tribal view. Consider museums. Human remains and cultural items are treated as

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CLAUDE CHAUCHAT

The Cupisnique French Archaeological Project's camp in the Peruvian desert.

## Peruvian Paleoindians

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access to large or even medium-size animals.

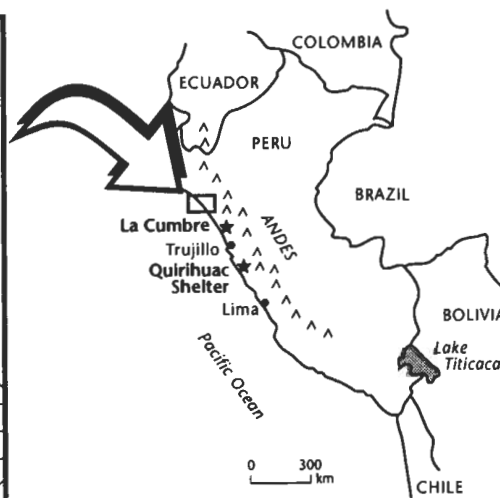
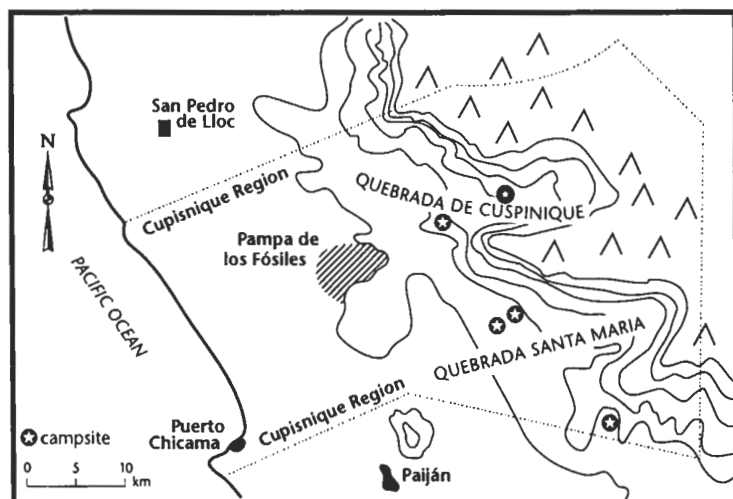
As withering drought gripped the land and sea level rose in response to melting glaciers, meat on the hoof was no longer available to the people to hunt. But they continued a tradition of making large bifacial projectiles, presumably following the custom of earlier generations of hunters whose quarry consisted of Pleistocene animals. However, projectiles that

would be effective against a horse, edentate, or elephant were no longer appropriate, for the people were now getting food from the sea, which had advanced from 10 to 50 kilometers onto the land. So Paiján knappers altered the traditional bifaces into a distinctive form that could be effectively used to stab and secure big fish they found.

"Such points would be very efficient on the soft flesh of large fish," Chauchat suggests, "allowing very deep penetration and avoiding the loss of spear and prey, which would certainly not be killed by the blow." With their slender, acute

tips, the altered points would have broken if they had been used on large land mammals, probably even before penetrating their tough hides, Chauchat believes.

"One can see no terrestrial hunting circumstances which could explain the Paiján point features, especially its elongated tip," says Pelegrin. And given that they are fishing points, Pelegrin believes they obviously came from a tradition in which points were tools bifacially flaked from one piece of stone. "If not," Pelegrin told the **Mammoth Trumpet**, "it would be incomprehensible that the Paiján points, as fishing points, could be





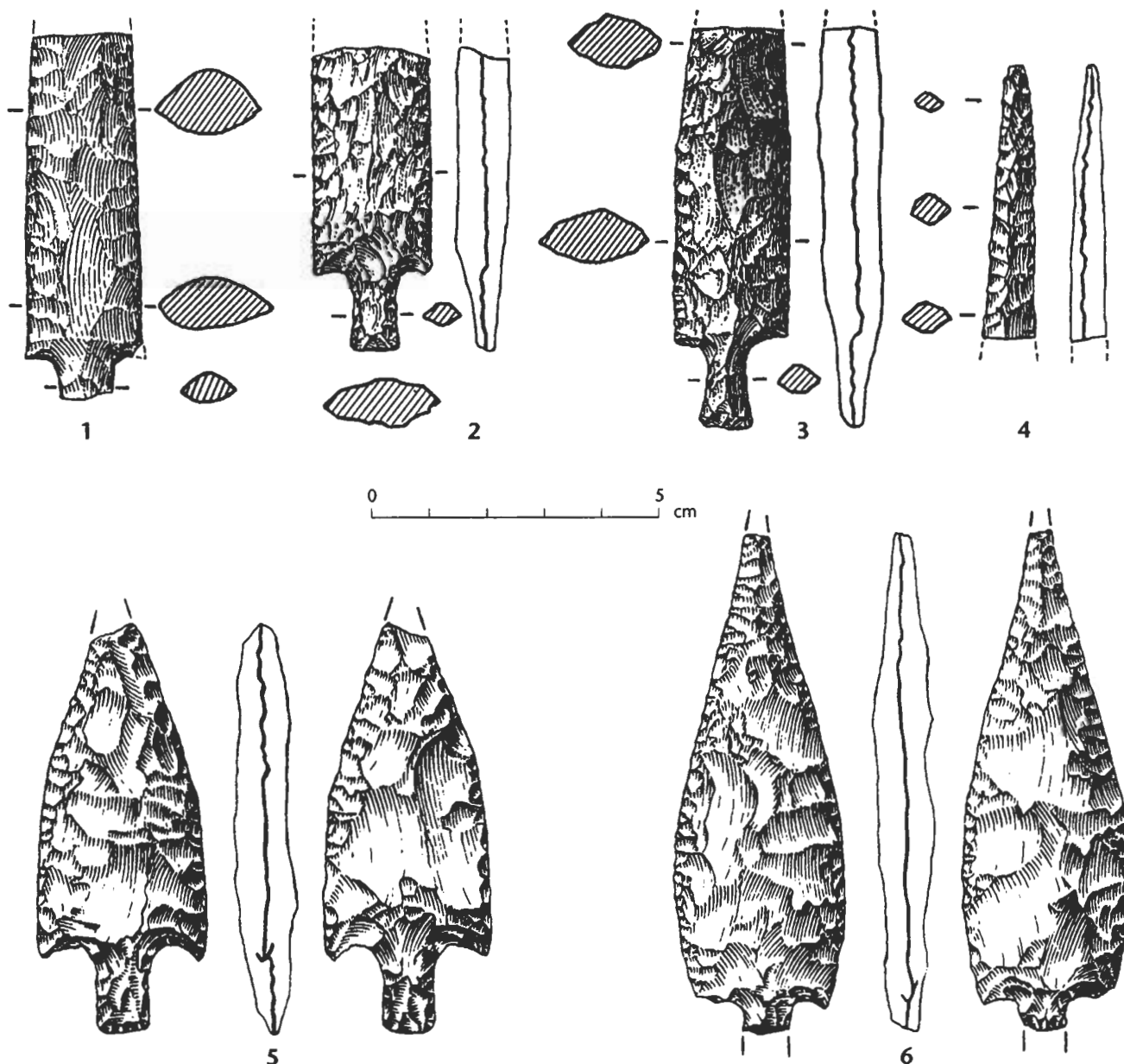
as they are. They should be made out of wood (a simple stick with a barb wing attached on the side) just as the spear points used by Peruvian Indians a few millennia later."

Chauchat elaborated on this point for us, noting the great expenditure of time and energy required to spear fishes with

such lithic projectile points. Creation of sufficient numbers of the fragile Paiján points would have required quite a lot of time and effort from flintknappers with high levels of expertise. "So it seems that the Paiján way of life was the imposition of a strong tradition of making bifacial lithic points onto a previously unus-

pected type of game—and environment. If tradition had not played a prominent role," he continued, "more-easily made types of spears could have been utilized." Very hard wood was available, and further, "pointed flakes can fulfill the same function if properly hafted. These solu-

*continued on page 10*



Drawings of Paiján points found by the French team at Pampa de los Fósiles and Quebrada Santa María.

Credits:

- 1 Claude Chauchat
- 2, 3 Pierre Laurent
- 4–6 Jean François Deridet

Drawings 5 & 6, ©1993 Society for American Archaeology, appeared in *Latin American Antiquity* 4(4):369 and are used by arrangement with the SAA.



During 1986 experiments in the Peruvian desert, Jacques Pelegrin analyzes a huge flake he has just separated from a block of rhyolite with a large pebble hammerstone.



## Replicating Ancient Artisans' Expertise

*French authority achieves quantitative, qualitative results from local materials by following a carefully devised strategy*

**F**RENCH PREHISTORIAN AND LITHIC specialist Jacques Pelegrin replicated several Paiján points following a systematic strategy that involved defining and describing each phase of the work and measuring its duration. Resultant flakes were counted and described. At the end of each phase of the work, Dr. Pelegrin determined the sizes and weights of the points.

The initial phase involved selecting pieces of local rock and making preforms referred to as Chivateros-type bifaces. Pelegrin and fellow prehistorian Claude Chauchat say it was a relatively quick but decisive step. Next, Pelegrin went to work with a billet of algarrobo, very hard wood available to the Paijánense, to remove large flakes by percussion. This was followed by a sub phase that removed somewhat smaller flakes. Finally, carefully wielding his wooden billet, Pelegrin proceeded to flake away very small, fine flakes to prepare the preform

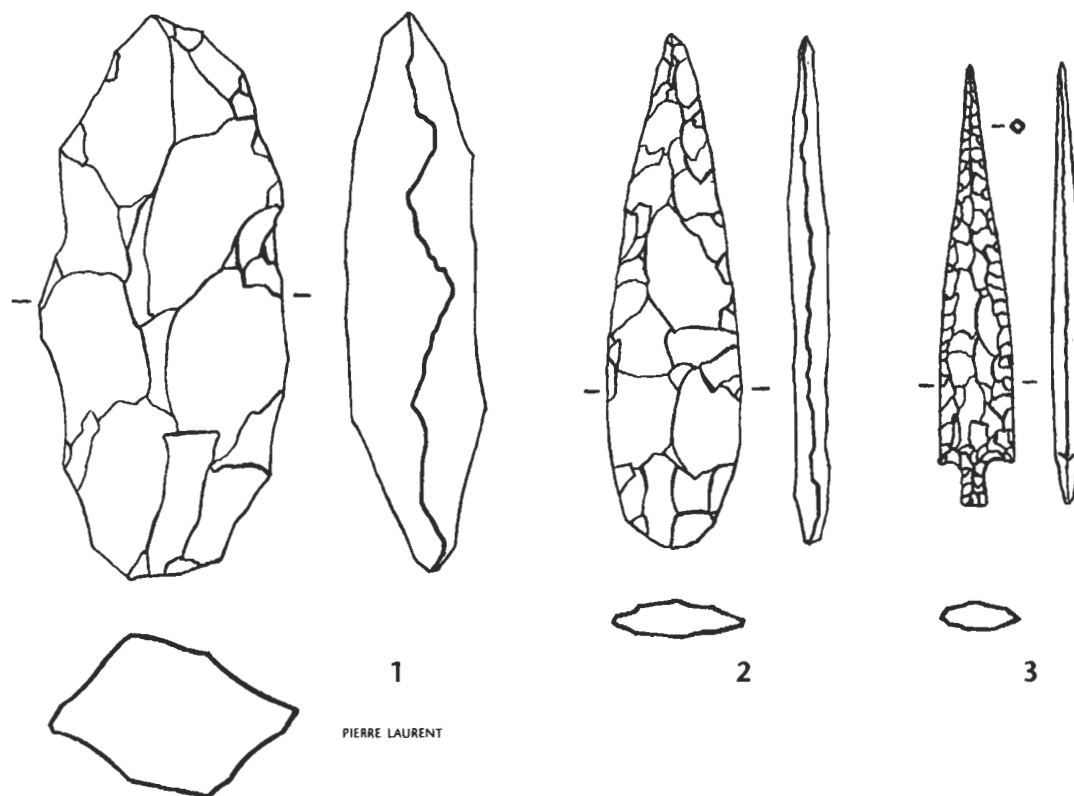


Diagram indicates the principal steps in turning locally available stone into Paiján points. The initial biface has the morphology of rejected pieces found at quarry sites; the French team now believes the first knapped biface should ideally be thinner and wider.

## Understanding the Work of Paijánese Flintknappers

for pressure flaking, the final phase of the work, which he executed with wood, bone and antler tools.

Pelegrin told the **Mammoth Trumpet** that the project was designed to fulfill several qualitative and quantitative aims. But he emphasizes that knapping tests could be performed only after a clear procedure had been established and after the fulfillment of important preliminary conditions. The first requirement was a careful examination of a large quantity and variety of archaeological material—the broken or discarded blanks and flakes from Paiján quarries and workshops. “This understanding should always precede any tentative reproduction,” he said. The second step was to collect and select the same raw material used by the Paiján people. Then as a third step, he made preliminary tests with different techniques on the raw material. Finally, it is necessary to have a highly experienced knapper who can adapt to the raw material and local tools.



Pelegrin applies his algarrobo billet for bifacial thinning of the stone.

CLAUDE CHAUCHAT



J. COLLINA GRIARD

Jacques Pelegrin (left) and Claude Chauchat explain bifacial knapping to Peruvian students from Trujillo on a Pacific Ocean beach.

Qualitatively, Pelegrin said the experiments:

- Helped define which specific flakes (or debitage) were actually coming out from the different types of blanks and from the different phases of the knapping process.
- Provided a necessary reference to make it possible to recognize the knapping techniques the Paján people used.
- Helped evaluate the level of know-how required for production compared with other types of tools the people produced.
- Helped the researchers appreciate the technical difficulty involved in the sub tasks, such as refining the tang, wings and distal tip, which allows them to understand priorities of the makers and constraints in their utilization.

Quantitatively, the experiments allowed the researchers to build an estimation of the number, size and weight of flakes created by different phases of the process, and an average time required to

complete the phases. "These estimates, acting as a reference data base, were thus put into use to classify the flakes from different archaeological scatters, and to give an estimate of the number of points actually produced per scatter, and the

*"Within the  
Paleoindian context,  
there is certainly more  
research to be done."*

time involved," Pelegrin said. In addition, he noted that they allow researchers to estimate the type of lithic blank and their average length.

The data allow researchers to calculate, within at least a one-to-three range, how many points were represented by a particular scatter of flakes in a site. For example, they might calculate that a scatter represented the creation of from two

to six Paján points, though none of the points remained.

Might such experiments be useful for understanding other sites in the Americas?

Possibly, Pelegrin says, at sites that offer the same conditions as the Paján sites. If only part of a site can be recovered—if part has been destroyed, for example—the quantitative estimations would be of little or no use. "The results you could not interpret with realistic significance," he said.

"That sort of quantitative estimation is best suitable to an open-air and desert-like site or workshop of reasonable size, where there is a good chance that it is the complete result of one occupation, undisturbed by subsequent occupations, and from which one can observe or collect everything."

Exporting the four qualitative aims of the Paján lithic experiments, however, is much less simple. The first aim, defining which specific flakes had come from the different types of blanks and from the different phases of the process, "could





quite often be fulfilled," he said, "helping to reconstruct the actual *chaîne opératoire*" or operative sequence of the prehistoric knappers. "On this matter, it must be strongly stressed that any technical process reconstruction—or 'understanding,' 'reading,' 'analysis'—must be primarily and totally based on the archaeological material." Results, he added, might help, possibly providing some confirmation that one's analysis of the archaeological material is not totally wrong. However, Pelegrin cautioned that there are chances of methodological errors too complex to discuss here.

The second qualitative aim, recognition of the different techniques used in the knapping process, should be fulfilled as often as possible, says Pelegrin. "Some cases are so clear—depending on the experience of the archaeologist—or simple, such as pebble tools flaked with another pebble, that there is little use to confirm the evidence. Other cases can be extremely difficult. Some techniques of blade production from the European Neolithic took me years and hundreds of tests to identify," he says. "But if we stay within the Paleoindian context, there is certainly more research to be done because it is not so easy to distinguish soft-stone direct percussion from antler direct percussion and from pressure." He adds: "And what about indirect percussion for thinning bifaces?"

Pelegrin adds another cautionary note: "That is then a matter for a specialist, not an amateur flintknapper who can just make a look-alike point his own and only way."

Experimenting to evaluate the skills and know-how of prehistoric knappers can mostly be done relatively, Pelegrin says. "It was both possible and interesting within the Paiján context because this industry shows a complete distinction within its tool production—very well-


*The experiments  
provided an estimation  
of the number, size and  
weight of flakes created.*

made and difficult Paiján points on one hand and very coarse and easily done pebble tools and flakes on the other."

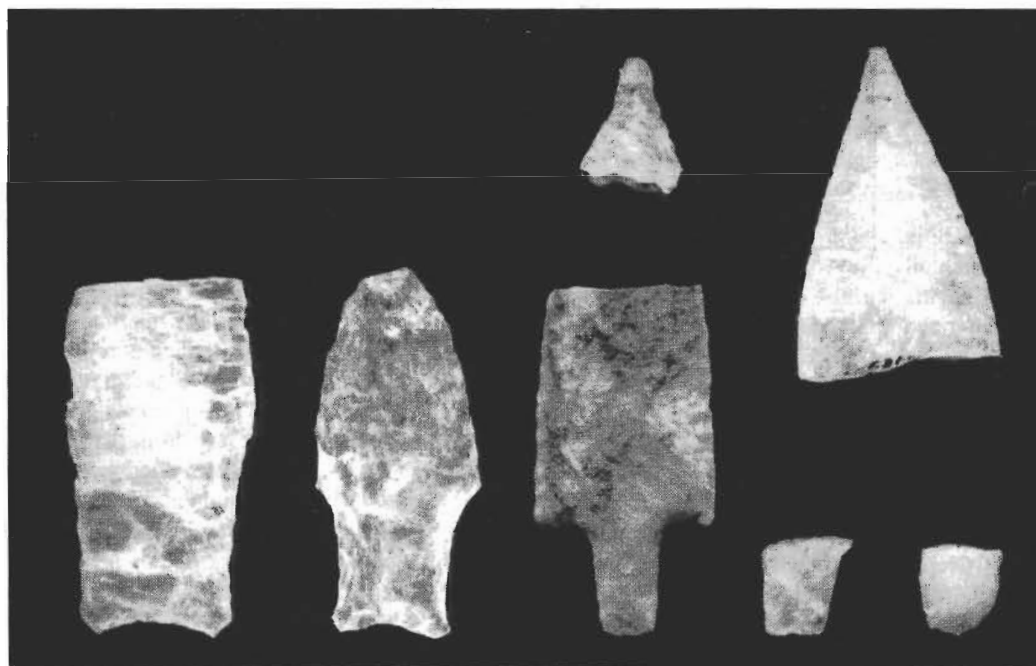
Pelegrin suggests that the fourth qualitative aim of the lithic experiments (gaining appreciation for the technical difficulty involved in the various subtasks and thus providing understanding of the makers' priorities, and constraints on utilization of the points) could possibly help in understanding how tools of the Clovis tradition evolved into later tool

types. "Pertinent experiments can help, but that level of interpretation depends on many different parameters such as morphology, technology, environment and tradition." Citing the Paiján experiments, Pelegrin observes: "First, Chauchat understood quickly, without any experiments, that Paiján points were likely made to fish, and rather heavy fish. He had good arguments," he adds, noting the shape of the points and the lack of large terrestrial fauna, but no lack of large fish vertebrae in the sites. Further, he could never find points with typical damage found on used spear or arrow points. "The experiments added little to this."

But, he says, the experiments confirmed that because the Paijánense knappers put so much effort in their achievement, the difficult-to-create features of the points were critical to the specific circumstances of their use. Remarkable on the discoveries by Jesus Briceño (main article) of fishtail and Paiján points in the same workshop, Pelegrin sees verification of Chauchat's expectations of sudden change from broad fishtail to slender Paiján points.

"Within a few fishing sessions, the Paiján people could understand how they should modify their spear points in order to avoid losing so many fishes swimming away with a large wound in their sides." 

—DAH



Assemblage from Quebrada Santa Maria shows fishtail and Paiján points found together by Jesus Briceño.

CLAUDE CHAUCHAT

## Peruvian Paleoindians

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tions have been met by a number of people around the planet."

Chauchat said: "Our guess is that Paiján points had other, social, rather than simply economic functions, maybe as status symbols or as a means of recognition of a male-specific activity."

Asked whether existing projectiles made to hunt land animals had been reworked to spear fish, Chauchat said there is no evidence of it. Most of the points were broken or unsatisfactory pieces found in lithic workshops. "It could have been that some pieces were reworked at the beginning when people first came in contact with the sea, but I believe that very shortly there was a conscious strategy of modifying the overall shape of the point to adapt it to the maritime environment." Chauchat says the stems were made more slender to be fixed in a hollow shaft, the tip was elongated for better penetration in soft flesh, and lateral barbs were shaped to keep prey from escaping.

The process has been documented by Peruvian archaeologist Jesus Briceño, who worked with the Cupisnique team in the Santa Maria Gorge. Briceño studied chipping floors there that had fishtail points on the surface. One such workshop that was completely excavated contained fishtail points together with Paiján points apparently made by the same workers. Both were made from the same materials, mainly milky quartz and rock crystal from a nearby outcrop. "This shows that at this time both types of points were made, probably for very different uses," Chauchat said.

"What is conspicuous is that there is no intermediate form between fishtail and Paiján points," he added. "It seems only that in this workshop, the latter are shorter than elsewhere and particularly the tips are less elongated. It seems to me that this people came to the coastal plain from the interior, possibly from the high Andes, and was confronted with the contrast of the aridity and consequent scarcity of terrestrial game and the evident wealth of the seashore." So the people adapted to the seashore.

Chauchat does not believe projectile points were used to hunt the lizards found

## Paiján Burials Analyzed

Study of early human presence on the Peruvian coast has included the excavation and analysis of several human burials. The first human remains at a Pampa de los Fósiles site were excavated in 1975 by Claude Chauchat and J. M. Dricot after bones were found eroding out onto the surface. As the Cupisnique French Archaeological Project continued, more were recovered.

In 1988, Chauchat and his colleagues dedicated part of their field work to excavation of burials. In all, 20 individuals have been recognized, 11 with sufficient material found in situ to assess the position of the body. Only seven of those have yielded skulls or parts of skulls; one additional burial revealed most of a skull although the remainder had been disturbed by burrowing animals.

Local grave looters have been a problem to the physical anthropology studies. Dr. Chauchat says that even though the burials contain no materials they value, the appearance of bone splinters has tempted looters to dig a hole that completely destroys the burial.

"The living sites are visible on the surface, and it seems that the burials were never dug very deep nor very carefully covered, so quite a number are eroding out on the surface, generally on

the fringe of the living sites," Chauchat told the **Mammoth Trumpet**. Some have been so destroyed that hardly a handful of bone fragments can be recovered. Living sites that have revealed burials, he said, generally had only one, he said—rarely more.

Chauchat notes evidence that the territories of the people probably extended across the coastal plain into the arid *quebradas*, or ravines, that come out of the western flank of the cordillera onto the coastal plain. The *quebradas* are rich in Paiján living sites while the plain contains the most lithic workshops. Subsistence territories, he speculates, probably were elongated transversely to the coast and were perhaps 70 kilometers or more in length.

Jean Paul Lacombe, physical anthropologist on the team, has analyzed all the human bones since the initial discovery in 1975 of a young adult, probably male, and an adolescent, buried about one meter apart. Both skeletons were complete and undisturbed, unlike some of the subsequently recovered human material. The adult seemed to have been buried on a mat with charcoal and ashes sprinkled above and below. Charcoal from below the burial provided a date of 10,200 ± 180 radiocarbon years B.P.

**Quebradas are  
rich in Paiján  
living sites.**

**The plain contains  
the most  
lithic workshops.**

in the Paiján faunal record; they are too fast and too small. He said that even *Callopistes* lizards that grow to one meter in length, have a body thickness of less than 10 centimeters. And he noted that according to ethnographic accounts, lizards can easily be caught in traps—sometimes in great numbers.

Does the lithic evidence connect the Paiján assemblage with lithics in other parts of South America or elsewhere?

"For a lithic specialist, the Paijánense lithic assemblage looks very much like

other contemporaneous assemblages, either in South America or perhaps also in North America," Chauchat replied. "In general terms there is in South America a very strong tradition of making projectile-point forms that are lithic and in one piece, as opposed to wooden, bone or antler ones and as opposed to projectile points made of several separate elements such as microlithic barbs. As a consequence there must be a high level of expertise in knapping stone as evidenced by Clovis, Folsom, fishtail points, etc. They

are particularly sensitive to stylistic (or functional) shape variation all over the world, so it is not that strange that they are so variable also in the Americas."

Chauchat points to a different kind of lithic tool found widely in Paleoindian assemblages of the Americas. "It is an ovate or bi-pointed multiple scraper or knife that I call 'uniface,' [in contrast] to the bifacial tools," he explained, noting that there is a problem with nomenclature, because the word "uniface" has "a quite-different meaning in the English vocabulary of lithic tools." The tools to which he refers look very much like Mousterian *limaces*, though they seem more variable in shape and size. Paul Ossa, who studied early human occupation of Peru's Moche Valley in 1969 and 1970, described them in the La Cumbre lithic assemblage by using the term "slugs" as a translation of the French *limace*. "They are exhausted pieces,"

### *Toolmakers were adapting to the disappearance of once-plentiful land mammals.*

Chauchat said, meaning that they have been intensively retouched for resharp-ening until they were too small to use. "There is some evidence that the originals were much larger. These scrapers are found all over South America. Recently, I examined some of them in the assemblages of the first Holocene layers of Pedra Furada and in neighboring sites in the Brazilian northeast. They also exist in Argentina," Chauchat said.

"But if we look at the lithic assemblage as a whole, the Paijánense is more different from Andean lithic assemblages such as Lauricocha, the Ayacucho sites, the Junin sites, and Guitarrero Cave—in fact from what could be called the 'Lauricochense'—than from spatially remote assemblages as the Pedra Furada Holocene component and probably from all the fishtail-point sites in South America." He added that he believes the Laurico-

chense came from an El Jobo tradition, which probably was always distinct from the Clovis mainstream. "But exactly what all this means in terms of peopling of the Americas, I cannot at this moment even begin to imagine," Chauchat added.

He noted that some archaeologists, such as José Luis Lorenzo of Mexico, insist that Clovis could not be the antecedent of fishtail-points of Central and South America because radiocarbon dates for South America are older than those for North America. "The more we learn about this stage in the continent, the more complex the situation appears."

Questions remain regarding the chronology of the Paiján occupation. Chauchat said there has not been a great deal of excavation done there since 1979 and most of the radiocarbon dates are from before that. "In 1988 we engaged in a second phase of excavation, but that was devoted mainly to burials [article, page 10], Pleistocene megafauna, and chipping floors," he noted. No radiocarbon samples were taken.

The researchers got an additional radiocarbon date from a site in Pampa de los Fósiles excavated in the 1970s that already has yielded four dates, Chauchat said. The earlier dates ranged from  $8,730 \pm 160$  to  $10,380 \pm 170$  radiocarbon years before present. The new date is  $10,640 \pm 260$  (GIF 9403) years ago. So far that is the earliest date associated with the Paijánense. "We are at a loss to explain why, at Quirihuc Shelter less than 100 kilometers south, Paul Ossa got two radiocarbon dates in excess of 12,000 B.P.," Chauchat observed.

Bone samples from Pleistocene megafauna excavated in 1988 have been dated by the Uranium series disequilibrium method. The results, presented in a paper published last year by the French Academy of Sciences (see Falguères in **Suggested Readings**), indicate that animals such as the mastodon lived in the Pampa de los Fósiles area until perhaps as recently as 14,500 years ago. "The results show that the last Pleistocene mammals in Cupisnique died uncomfortably close to the arrival of the first humans," Chauchat told the **Mammoth Trumpet**, but the evidence clearly does not implicate humans in the animals' extinction.

Rising sea level likely had the effect of altering the climate of Peru's coastal

plain. When the sea had been lower and thus farther to the west, the climate of the interior presumably would have held greater sway, meaning more rain and more runoff from the Andes to support plants and nourish animals. With Holocene sea-level rise, not only did the coastal plain shrink, but proximity of the cold ocean and resultant temperature-inversion layer prevented atmospheric moisture from condensing into rain. Fog now supplies much of the existing moisture near the coast.

Chauchat reports evidence that the land was not so dry in the time of the Paijánense. For example, in Pampa de los Fósiles there were land snails, too small for consumption, of a species now found

## Mesquite Tools?

The Peruvian algarrobo tree, from which Jacques Pelegrin fashioned a billet for experiments in processing local rock into Paiján points, is a close relative of the North American mesquite (*Prosopis juliflora*). There are several species of these locust-type trees, bean-like fruits of which have long been utilized by humans. People also have used fiber from the bark, and a variety of birds and animals depend on the trees for food and shelter.

Algarrobo wood is so hard and dense that it will not float in water. Claude Chauchat suggests that mesquite wood might be ideal for flint-knapping experiments. Do any of you Southwestern knappers have mesquite mallets in your kits?

only in moist places. Further, the presence of milling stones indicates that there was vegetation that produced seeds suitable for milling. Indeed, although the region remains one of Earth's driest, seeds of the algarrobo tree are still available and could be used as food. Chauchat notes that the algarrobo is closely related to mesquite (*Prosopis juliflora*) of North America, the seeds of which have been ground to produce a sort of tortilla. ☛

—DAH



# FOLSOM BISON KILL OFFERS CHALLENGES



The middle bone bed pictured during the 1994 excavation. Note the articulated condition of the bison skeletons. Bones of at least 10 animals are visible.

## Articulated Bones Pose Questions for Oklahoma Team

Late in summer more than 10,000 years ago, people drove a group of cows and calves up into an arroyo that had no outlet. Near the head of this gully, other people were hidden in wait, ready with spears tipped with deadly Folsom points. These hunters speared the beasts, Pleistocene bison, and then set upon them with keen-bladed knives, cutting away hides and cleaving flesh. When the work dulled their blades, the people resharpened them on the spot and proceeded taking food and hides.

This scene, near the North Canadian River in what is now Harper County in northwest Oklahoma, was repeated on at least two successive seasons. Existence of this Great Plains butcher shop might have been lost to time except for chance erosion of the river. Over the millennia, the meandering river's floodplain cut into the arroyo that had been used to trap the bison. In the process it eventually exposed a profusion of bison bones, which came to the attention of archaeologist Leland C. Bement of the Oklahoma Archaeological Survey.

Bement led an initial survey of the site in 1993 and a more extensive field project there last summer. Though it might seem quite apparent and predictable that High Plains peoples trapped and butchered bison, Dr. Bement's continuing analysis of clues from the site, officially designated 34HP45 or the Cooper site, is yielding evidence that is not easy to explain.

- Bones of the bison were not disarticulated. Except where erosion had rearranged them, bones lay in anatomical order.
- Though not immediately buried, as by blowing sand or dust, the bones show no obvious signs of being scavenged by wolves or coyotes.
- Though the bone appears well preserved, radiocarbon analysis has not been effective, offering dates much younger than the well-established age span of the Folsom tradition.

LELAND BEMENT



OKLAHOMA ARCHEOLOGICAL SURVEY

During excavations in 1993 of the uppermost bison-kill deposits, Dr. Leland Bement sets up the surveying rod. Other team members visible include Ken Bloom, left, Gemma Mahalchick, behind Bement, and Dave Morgan, foreground.

Field work was completed last summer, but laboratory analysis of the thousands of bison bones from the Cooper site will keep Bement busy for a long time. The bones already have allowed investigators to explain much about those Plains hunts more than 10,000 years ago.

And they would seem to offer cautionary lessons to those studying paleontological or archaeological sites: bones of butchered animals were not necessarily disarticulated, cracked open, or left scattered or in heaps. Also, in spite of technical advances, bones continue to challenge radiocarbon laboratories.

But there's no doubt who the hunters were. "We recovered parts of 32 Folsom points, eight large flaked knives and 116 resharpening flakes," Bement said in a recent telephone interview. The flakes, he said, indicate that as the butchering knives became dull the people resharpened them there at the kill site.

The variety of cherts from which the tools were made supports accepted theories that Folsom people roamed widely on the Plains. Principal sources of chert were the Edwards Plateau of central Texas, more than 350 kilometers south, Alibates quarries of the Texas panhandle, about 140 kilometers southwest, and the Niobrara region of northwest Kansas and

southwest Nebraska some 220 kilometers northwest. Bement noted that if the hunters actually visited those sources they traveled extensively.

The lithic material, of course, was a relatively small part of the material excavated from the Cooper site. "A lot of the deposits had to be removed because there was no way to protect the site," Bement said, explaining that it is in a public hunting area. It already had been vandalized.

"We brought back 150 boxes of bones including 42 skulls," he said. "So I've got a lot of material to work with." The bison bones came from all three levels. "The exact number of individual animals is unknown as yet," Bement added. "We're still in the preliminary stages of analysis." Field work on the three levels representing three late summer hunts revealed counts of 15 animals in the upper two layers and 12 in the lowest layer. In addition to those 42 found in the three separate layers are bones of 30 more animals found in a mound of material that slumped off a bluff at the margin of the river's flood plain. Those bones came from all three of the layers as erosion removed parts of the site.

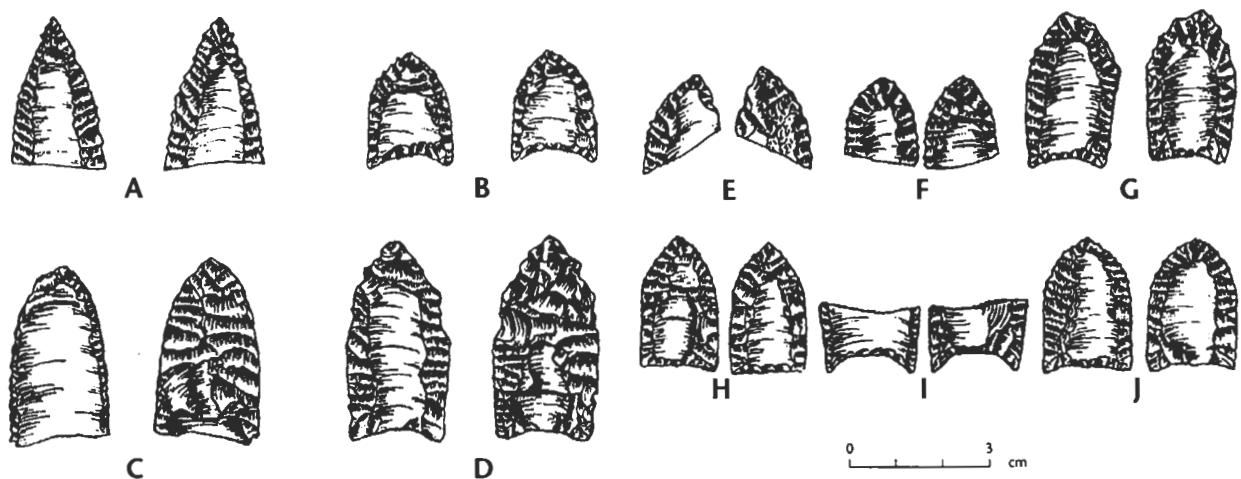
Explaining the topography, Bement said that at the time of the kills, an arroyo or gully came down onto the floodplain.

At that time the river ran an elevation two or three meters above its current level. "The river has meandered back and forth enough over the last 10,000 years to wipe out all but the very upper end of the gully," he said. Sandstone that underlays the site protected the bone deposits above. What remained for archaeologists to examine was an area of about six by eight meters containing a portion of the kill site. Dr. Brian Carter, soils scientist with the Oklahoma State University, is conducting a geomorphologic analysis at the site to enhance this interpretation.

"We have absolutely no evidence for a camp nearby," Bement said. He said that such kill sites can be expected to have camps nearby, but if the hunters camped down the slope after their kill, the North Canadian River long since removed all evidence of it. If the camp were up the slope from the kills, his team has not been able to find any remaining evidence.

Gradual slope wash coming down the old gully buried the bones remaining after each kill, and it eventually filled in the gully. Bement said the gully apparently was filling in at the time of the kills and the filling continued. Level of the bone beds was approximately seven meters above the current flood plain, as much as two meters below the current surface.





CURRENT RESEARCH IN THE PLEISTOCENE/LELAND BEMENT

Drawings illustrate projectile points from the Cooper site. A, B, and H came from the mound slumped from the bluff. I is from the lower bone bed. The remainder came from the upper bone bed.

Because no bulls are represented in the bones discovered at the site, it isn't obvious whether the animals were *Bison antiquus*, which had long straight horns, or its evolutionary cousin *Bison occidentalis*, which had curved horns. Measurements of the material, however, place some of the cows at the upper size range expected for *antiquus*, Bement said. "Tentatively we're calling them *Bi-*

*son antiquus*, but that could change as our analysis goes along."

It was analysis of the calves' tooth-eruption patterns that told Bement and his team that the kill took place in late summer. Patterns from all three kills were the same.

The question of why butchered animals remained articulated is one Bement and his team are going to be carefully

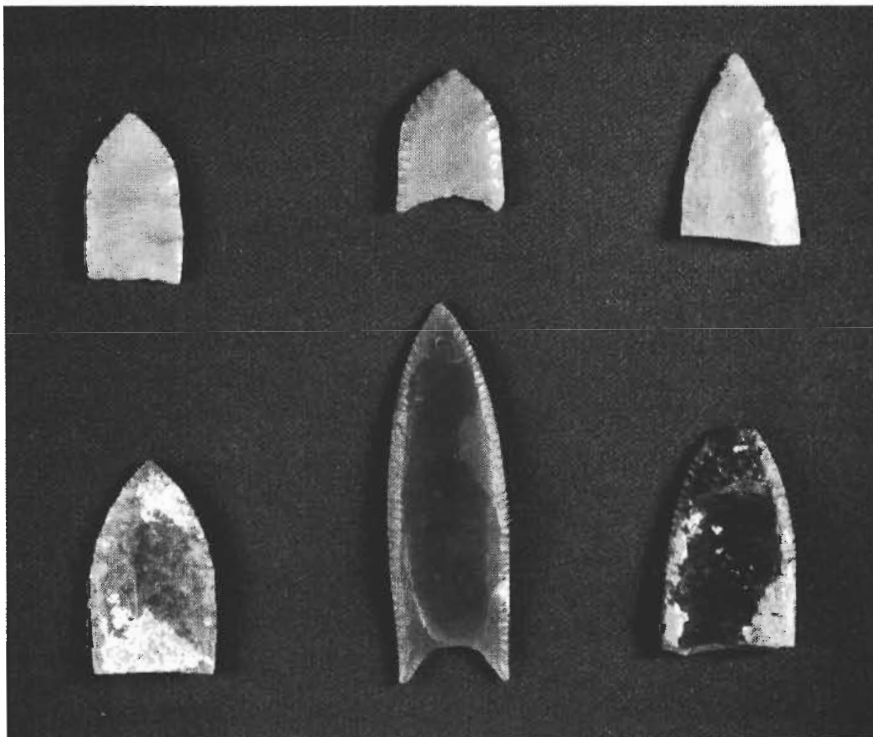
analyzing as they examine the bones from the 150 boxes trucked from the Cooper site to their laboratory at the University of Oklahoma in Norman. "We're going to be looking at how much of them was actually butchered," Bement said. He referred to the study of a Folsom site in the Texas panhandle site a few miles southwest of the Cooper site that was studied several decades ago. The Texas site also yielded several articulated bison skeletons as well as several that were scattered. Researchers had assumed that the articulated animals had not been butchered because the disarticulated animals had provided plenty of food.

The Cooper site may force a reanalysis of that and possibly other sites where animals remained articulated.

"We have one completely articulated skeleton with all sorts of cut marks up and down the ribs," Bement said. The Folsom hunters had evidently removed hide and meat without dismembering the animal.

"It's possible that we're looking at a sort of gourmet butchering process," Bement said. Perhaps the people took only the choice cuts of meat and left the remainder.

Those remains should have provided a feast for scavengers, but if so they did nothing to rearrange the bones as animals such as wolves and coyotes usually do. "That's another question we have to deal with from a taphonomic standpoint." He said there was evidence that gophers were among the bones, gnawing on them,



Examples of Folsom points from the Cooper site.

0 5 cm

LELAND BEMENT


"but we don't have canids. We don't have evidence that canids or other scavengers were in there" chewing the bones or pulling them apart.

Does that mean the bones were buried very quickly? Bement believes the bones must have been covered relatively quickly to preserve the skeletons so well, but they wouldn't have been buried quick enough to hide them from scavengers. In fact, some seem to have lain in the open for a considerable time. As Bement explained:

"We have evidence that some skeletons were exposed at the time of the next kill. We have bones that have been trampled. They have nice circular depressions on them the size equivalent of a hoof print." This evidence of trampling, he said, appeared at the edges of the bone deposits, so it seems that at the time of the second or third hunt, some bones were still protruding from the sloping floor of the old gully.

Though preservation of the bison bones appears excellent, Bement said, "our attempts at dating just haven't panned out. We've tried regular carbon-14 on the bone and on tooth enamel." One sample produced a radiocarbon date of 7,000 years and another no more than 9,000." Because of the obvious association with Folsom tools, further attempts to date the bison remains aren't a high priority. A sample of soil humates taken directly below the earliest kill produced a minimum age of 10,000 radiocarbon years.

To understand the environment at the time of the Folsom hunters, Bement must rely on environmental reconstructions from other sites on the southern plains because the sandy deposits of the Cooper site did not preserve pollen that could be studied. He believes that the region was a grassy plain, although probably cooler and damper than the current climate.

Excavations at the Cooper site were financed by a grant from the National Geographic Society, the Graduate School of the University of Oklahoma and the Oklahoma Archaeological Survey. Bement said interested persons also contributed to the cost of the project. The continuing investigation will take place in the laboratory in Norman. If there were to be additional field work at the site, it would likely be to seek more information on the geomorphology or soils. 

-DAH

## Baked Clay Fragments Reveal Evidence of Oldest Weaving

Olga Soffer and James M. Adovasio have described evidence of weaving that date to more than 25,000 years ago in Eastern Europe. The evidence, presented recently to the Society for American Archaeology meeting in Minneapolis, indicates that the technology for making cloth, nets and baskets is far older than scientists had believed. Both Dr. Soffer, of the University of Illinois at Urbana, and Dr. Adovasio of Mercyhurst College in Erie, Pa., elaborated on the discovery in interviews with *The New York Times*.

Evidence of the weaving was preserved in impressions left in fired clay first unearthed in 1954 in what is now the Czech Republic by a Moravian archaeologist. In 1990 when Soffer was studying clay fragments from the Czech site, she found four that had negative impressions of weaving—a textile or finely woven basket. Soffer, featured by the **Mammoth Trumpet** in 1986 for her analysis of mammoth-bone dwellings in Ukraine (MT 2:4), was intrigued and showed them to Adovasio. Adovasio, who has been involved with textiles for many years, studied the impressions through the use of highly magnified high-resolution photographs and found that they had been made by plant fibrils.

The researchers say the clay had been fired at between 600 and 800 degrees Fahrenheit, suggesting the heat of a bonfire, simple kiln or perhaps the accidental burning of a dwelling. They don't know if the impressions were accidental or purposeful, but some were associated with ash deposits.

For **Mammoth Trumpet** readers, they may bring to mind the intriguing clay impressions of hand prints discovered in Pendejo Cave near Orogrande, N.M., by Richard S. MacNeish and his Andover Foundation for Archaeological Research team ("Pre-Clovis Human Prints


Found in Clay," MT 7:1, and "Pendejo Investigation Continuing," MT 7:4). Those impressions in baked clay revealed characteristic ridges with intervening grooves complete with imprints of sweat glands. The prints were not immediately accepted as positive proof that ancient humans had lived in Pendejo Cave, however, because the clay impressions dated to 28,000 years ago, well before the commonly accepted time for human occupation of the Americas. Soffer and Adovasio don't have to convince other scientists that there were humans in eastern Europe more than 20,000 years ago.

What's more, there is convincing evidence that later prehistoric weaving couldn't have somehow been misdated. Radiocarbon dates from the Czech site range from 24,870 to 26,980 years B.P., and no evidence was found that people

were there later. As Soffer told *The Times*, Alpine glaciers and the huge Scandinavian ice sheet were advancing on Central Europe, so the people who did the weaving had to leave.

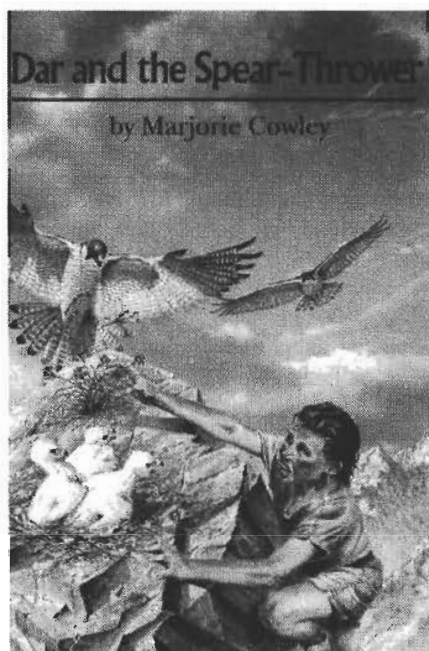
Adovasio says it isn't possible to say what made the impressions in the clay, but he described it as being similar to a potato

sack. Possibly it could have been a bag, mat, clothing, or a basket. The makers of the weaving that marked the clay surely were making nets or snares to catch food, says Adovasio. He believes archaeologists have overemphasized the importance of stone tools because they preserve well while fibers rarely are found in archaeological sites.

Adovasio and Soffer reported that while the faunal record from the Czech site includes mammoth bones, there were many more bones of smaller animals such as rabbits. Rabbits could be more readily caught in nets than with spears. 

-DAH

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*Author-teacher Marjorie Cowley:*

## Introducing Children to Prehistory

**B**ACK IN THE 1950S, during a honeymoon in Paris, Marjorie Cowley chanced upon a folder of prehistoric cave paintings. "I had never been introduced to this field," the California teacher and author explained in a recent telephone interview, "and this fascination simmered in my mind for years."

When she heard of a program at the UCLA Fowler Museum of Cultural History that trains and sends volunteer teachers into local public and private schools, Ms. Cowley eagerly joined. Through the program, students receive a rare opportunity to see and touch a representative selection of the museum's vast collection of ancient Old World tools and to hear a presentation on human prehistory.

Thus began a teaching career that has spanned 15 years and grew to include a year-long course, on a once-a-week basis, that begins with the African hominids and ends with the Cro-Magnons. She created and taught a 30-hour curriculum "Prehistoric People and Their World" to students from third to 12th grade; designed teaching charts for the Prehistoric Museum Project at the UCLA Museum; has been an instructor at the Los Angeles Children's Museum; has designed and calligraphed charts for a Los Angeles school district prehistoric study unit; has been a guest lecturer in prehistory at Santa Monica College; and has been designated a Professional Expert by the Los Angeles school district. She is a member of the Society of Children's Book Writers and the Society of Calligraphy, Los Angeles.

A Cro-Magnon initiation ceremony Ms. Cowley devised is the culminating event in her year-long curriculum. "Through the years, the pageant gets deeper and stronger," she says. "It also comes at the right time; a few weeks before sixth-grade graduation. The students are absorbed by this ceremony that focuses on the formal, witnessed change from child to adult within a community."

The students write all parts for the pageant, parts including the shaman, the initiates, and the tribal leader. Ms. Cowley

selects the best pieces for the performance, and the students easily project themselves into their roles. They come to appreciate particulars such as "a unifying creation story," which is chanted by the shaman, and the dividing line between the status of a child and that of a responsible adult with obligations to the whole community.

This initiation ceremony, which has no real counterpart in our own society, seems to matter greatly to her students. "Except for some religious rites, this is a forgotten idea today," Ms. Cowley observed. "We've extended childhood so long that it presents us with a serious problem, it seems to me."

The idea for her children's novel, *Dar and the Spear-Thrower*, grew out of the excitement the initiation ceremony generates in her students. "My book centered on the theme of what it is that changes a boy into a man—in his own eyes, and in the eyes of his people." The setting for the book is Western Europe of 15,000 years ago.

*Dar*, Ms. Cowley's first published book, also reflects her interest and appreciation of ancient carving, cave paintings, the hunting-gathering life and tools associated with it. Her research and writing work well together, she says. "They fuel each other. I'll come upon something like the instinctive defense behavior of musk-oxen and think that this could make a great scene in the book. The idea of the spear-thrower has always delighted me. I thought I could have a boy—Dar—not invent it, but realize its value when he sees it demonstrated by a stranger. Dar's quest for the spear-thrower gradually leads him to an appreciation of what it means to become an adult. His love of carving, in addition to his becoming a skilled hunter, will eventually make Dar a valued member of his group."

California now requires the teaching of prehistory in sixth grade. *Dar* has been approved for legal compliance and inclusion in the new listing of materials by the state's Department of Education.

Now Ms. Cowley is working on a second book, *Anooka's*



MARJORIE COWLEY

Fifth-grade students at Logan Elementary School in Los Angeles enact a Cro-Magnon initiation ceremony, a culminating event in Ms. Cowley's year-long curriculum. Focused on the passage from child to adult within a community, the pageants are written and acted by children. At the left, three "initiates" in light tunics flank a "shaman," hand raised, and a "clan leader." At the rear are the narrator and a "parent representative." Below, drummer and clan leaders pose before cave paintings made as a class project.

*Answer*, also set in prehistoric Western Europe. The principal character is a girl who must make a difficult decision: whether to go with her mother, an itinerant healer, or create a life of her own.

Asked whether girls might feel left out of her first book with its central male character, she replies negatively. "I get wonderful letters from girls, who loved *Dar*. It made me realize that most females growing up in this culture spend a lot of time seeing movies with a male protagonist and reading books with a male protagonist. We're kind of used to it. The reverse is not true."

Although she has taught the whole age spectrum of youth from kindergarten to college, Ms. Cowley has not detected much difference in general interest in the subject of prehistory. Within the UCLA program, she pioneered in the teaching of prehistory to very young children. Few teachers, she says, felt it was worth their time. The young children were a revelation to her, being excited by the tools and interested in the subject raised by an introduction to prehistory. "Some little kids' questions are so dazzling that they take your breath away," she said.

In students through the sixth grade, interest is high and overt. But it is different with the junior high and senior high school crowd. "It's the rare student that will demonstrate open enthusiasm." However, when she invites them to come up and inspect the tools, "they will privately speak of their fascination with the subject and often ask searching questions."

Is it the exotic nature of ancient times that attracts students?

"Yes, that, but I think in all of us there is a natural curiosity about ourselves and our past." The various creation myths all deal with the same basic questions. Scientists have their own way of dealing with these mysteries, but the quest is the same: Who are we? Where did we come from? What makes us human?"

Finding successful teaching techniques is a vital element in presenting the subject. Lectures do not work with students



MARJORIE COWLEY

younger than college age. Asking leading questions is a good method of involvement. For example, she might ask: "What do you think are the advantages and disadvantages of upright walking?" or "What was the significance to human life when fire-starting was discovered?" Short dramas and participatory games are successful in making the remote past come alive, she found.

"I try to get students to think like archaeologists. Pointing out to students the assumptions about the past that are made without much thought or documentation is a good way to get





them to understand the difference between hard evidence and intelligent guessing—tentative conclusions based on some evidence.”

“In my classes,” says Ms. Cowley, “the full sweep of the history of living things is emphasized, with most of the class time spent on human evolution in the context of life on Earth. The first class project is always an accurate time-line mural. The

class is divided into small groups, with each group presenting both information and drawings of their segment of the mural—one-cell organisms, fish, reptiles, birds, primates and so on.” To orient her students to geological time, the mural, which usually covers an entire wall of the classroom, is referred to frequently during the year.

Ms. Cowley points out to students that

scientists in the field of prehistory are often in disagreement with each other, with theories colliding until there is some general agreement upon a way to view a problem or incorporate new discoveries. She recalls that in her own education, science was usually presented as a proven body of facts. Her realization that this is anything but the case was a revelation she wanted to pass on to her students.

In *Dar and the Spear-Thrower*, Ms. Cowley emphasizes the continuity of human nature—the anxieties, yearnings, fears, and joys that span the centuries. “I think that 15,000 years ago is not old in light of the millions of years we’ve been on this planet. Cro-Magnon were us and we are them. Competitiveness and strife, inventiveness and creativity, are all very much with us today.”

—Jeanne Riha

## New Books

***Vertebrate Taphonomy*** by R. Lee Lyman. *Cambridge Manuals in Anthropology*. Cambridge University Press, Cambridge. xxvi + 524 6½-by-9¾-inch pages. 1994. \$37.50 (paperback).

Vertebrate paleontologists study the bone and fossilized remains of once-living animals, but what they really want to know is what the animals, and the ecosystems of which they were a part, were like in life. Archaeologists study vertebrate remains for the same reasons and also want to know whether, and in what manner, humans were involved in producing the array of materials that survived. Because their goal is reconstruction of human cultures, archaeologists pay special attention to any telling marks on these bones that indicate human presence and activities.

Taphonomy is the study of the processes—environmental, human, and animal—that participate in transforming deceased organisms to materials uncovered in sites; in order to create an image of what the organisms were like in life, it is necessary to reconstruct the processes that affected the organisms after they died. As Lee Lyman writes, “Taphonomy is concerned with the differences between what the paleontologist or zooarchaeologist lays out in the laboratory for study, and, variously, the biotic community and/or individual animals represented by that laid-out material” (p.114).

Chapter titles of this manual for archaeologists indicate processes that participate in the transformation process. After introductory chapters on the history and practices of taphonomy as an academic discipline, and an informative chapter on the structure of bone, the book addresses issues such as mortality, skeletonization, disarticulation, and scattering; accumulation and dispersal of bones; differential frequencies of skeletal parts; butchering, bone fracturing and bone tools; burial; and diagenesis (change in composition of bone after burial).

Taphonomy is a particularly important subject for people who are interested in data related to the peopling of the Americas because ancient vertebrate bone—whether it has been cut in food-processing or deliberately shaped into tools—may well prove to be the earliest evidence of humans in the Americas. Lyman indicates that such evidence must be subjected to great scrutiny, with all possible non-human agents of taphonomic processes ruled out before human agency is attributed. Citing the work and attitudes of other scholars, Lyman warns of factors that could suggest unwarranted antiquity of the human presence. For example, stratigraphic mixing could result in a post-burial association of animal and human remains, or a prehistoric person could have picked up and used a fossilized bone. Lyman cites C. D. Fisher’s study of late-Pleistocene mastodon remains, published in *Paleobiology* (10:338–357), as offering convincing, multiple lines of evidence for human agency and thus establishing a human presence.

Lyman continually reminds readers of the key principles of the discipline; chapters could have been taken from lecture notes. Other features include a number of charts and figures, a glossary, and references.

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# Ground Sloth Authority Describes Research in Florida Mineral Spring

Paleontologist Greg McDonald recently described interdisciplinary research at a Paleoindian site at Warm Mineral Springs, Florida, at a CSFA-sponsored lecture at Oregon State University. McDonald, paleontologist at Hagerman Fossil Beds National Monument in Idaho, worked at the site during the 1970s. A recognized expert on extinct sloths, he has a master's degree in zoology from the University of Florida and a doctorate in geology from the University of Toronto.

Warm Mineral Springs, a private spa, is a 230-foot-wide pool rising to the level of surrounding lawns that are dotted with lawn chairs. Visitors to the Sarasota County resort, near the west coast of Florida, luxuriate in the warm mineral-rich water that has long been sought for relief from arthritis and other chronic ailments. Florida, Dr. McDonald reminded his audience, was a very different place in

the late Pleistocene; lower sea level meant that the Florida peninsula was as much as twice as wide as it is now, and its land was a dry limestone plateau, perhaps similar to today's American Southwest. The water level at Warm Mineral Springs 11,000 to 12,000 years ago was as much as 90 feet lower, down near-vertical limestone walls. It was a deep cenote with a circular ledge about 45 feet down.

McDonald described research confirming that Paleoindians regularly climbed down to that ledge. Rising sea level at the beginning of Holocene time brought about the rise in the water table that filled the limestone shaft and inundated organic matter in an anaerobic environment that preserved it. Wedged into cracks of the limestone, researchers have found wooden pegs, apparently used the way mountaineers use pitons to negotiate vertical rock. And besides low-

ering themselves onto the cenote ledge, Paleoindians lowered at least one dead person, whom they buried under rocks on the ledge. The burial, he noted, was similar to burials early peoples conducted in the arid Southwest.

Warm Mineral Springs had been something of a birthplace for underwater archaeological techniques, having been investigated as early as 1959. McDonald said research there in the mid 1970s established that archaeologists could maintain stratigraphic control though working under water. The team pioneered the use of underwater video cameras and recording equipment, which allowed non-divers on the surface to observe work being done by the diving team 45 feet below. Horizontal grids and views of vertical profiles of the stratigraphy, he emphasized, were maintained much as at dry land sites.

As a paleontologist, McDonald was principally interested in the ecological requirements of ground sloths. He was called on to identify and recover the many bones of Pleistocene animals found on the ledge and under overhanging rock behind it. McDonald was called on to excavate the well-preserved skeleton of a juvenile sloth, *Megalonyx jeffersoni*, and while working on the ledge he discovered the very weathered bones of a saber-tooth cat (*Smilodon fatalis*).

The site's faunal record included smaller animals including fresh-water frogs, which led McDonald and his colleagues to the understanding that in Pleistocene time, the cenote's salt water supported a lens of lighter fresh water on its surface. Now, the mineral-rich water that makes Warm Mineral Springs a popular spa wells to the surface and people have long sought health benefits of bathing in it.


McDonald may have left his CSFA audience apprehensive about the future of research at the site, which no doubt still has much to reveal. Though organic materials are well preserved there, underwater archaeology is expensive and slow. He said that a team making two dives during a 12-hour work day could get six or six and a half hours of underwater work accomplished at the ledge. The spring is about 200 feet deep, however, and examining the mysteries at or near the bottom is much more difficult. At

## Scholars Form South American Association

Researchers studying human occupations of the late Pleistocene and early Holocene in South America have organized the *Asociación Latinoamericana de Estudios sobre el Poblamiento Temprano*, or ALEPT. The association grew out of a 1994 symposium on Paleoindians and First Americans that met during the Congreso Nacional de Arqueología Argentina held in Mendoza, Argentina.

Participants in the Mendoza meeting found it so useful they welcomed the suggestion of Chilean researcher Lautaro Núñez Atencio that the session be given continuity. The new organization is being coordinated by Argentina researchers Nora Flegenheimer of National University at Mar del Plata, and Laura Miotti of the UNLP Museum in La Plata. Goal of the coordinators will be to advance communication among researchers working on the peopling of Latin America and to promote the group's next meeting. Flegenheimer and Miotti said another

session probably will occur within two years at Dr. Núñez Atencio's institution, the Universidad del Norte in San Pedro de Atacama, Chile. William Mayer-Oakes of Texas Tech University in Lubbock is serving as the U.S. delegate to the organization. Other delegates are Dr. Núñez Atencio from Chile and Arturo Jaimes from Venezuela.

The May session in Mendoza attracted 19 proposals for papers, 12 of which were presented at the meeting. Besides the papers, artifacts from several early sites were exhibited. They included material from Agua de la Cueva, Cerro la China, Cerro el Sombrero, and Pedra Museo in Argentina; Tagua-Tagua in Chile; and casts from El Inga and San José in Ecuador. Flegenheimer and Miotti said participants valued the opportunity to meet other researchers working on problems of the peopling of South America and learning about their work. 

# SUGGESTED READINGS

## ON Paleoindians of Peruvian Coast

Chauchat, Claude and Pelegrin, J. 1994  
Le Premier peuplement de la Côte Désertique du Pérou. In *Le Peuplement Préhistorique de l'Amérique*, Bulletin de la Société Préhistorique Française, Tome 91, 4-5 pp. 275-280.

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Tecnología y Funcion de las Puntas de Paján: El Aporte de la Experimentación. *Latin American Antiquity* 4(4):367-382.

Chauchat, Claude 1992 Préhistoire de la Côte Nord du Pérou: le Pajanién de

Cupisnique, *Les Cahiers du Quaternaire* 18:391. C.N.R.S. Editions, Paris.

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Chauchat, Claude 1988 Early Gatherers on the Peruvian Coast. In *Peruvian Prehistory*, Richard W. Keatinge editor, pp 41-66. Cambridge University Press.

Chauchat, Claude 1987 Niveau Mrin, Écologie et Climat sur la Côte Nord du Pérou a la Transition Pléistocène-Holocène. *Bulletin de l'I.F.E.A.*, 16:1-2:21-27.

Falguères, Christophe, M. Fontugne, Claude Chauchat and Jean-Luc Guadelli 1994 Datations Radiométriques de l'Extinction des Grandes Faunes Pléistocènes au Pérou. In *C.R. Acad. Sci. Paris*, t. 313, series II, pp 261-266.

Lacombe, Jean-Paul 1994 Anthropologie Physique des Hommes Précéramiques Anciens du Pérou. In *Le Peuplement Préhistorique de l'Amérique*, Bulletin de la

Société Préhistorique Française, Tome 91, 4-5 pp. 281-289.


## ON Oklahoma Bison Kill

Bement, Leland C. 1994 The Cooper Site: A stratified Paleoindian Bison Kill in Northwest Oklahoma, *Current Research in the Pleistocene* 11:7-9.

Hofman, Jack L. 1991 Folsom Land Use: Projectile Point Variability as a Key to Mobility. In *Raw Material Economies Among Prehistoric Hunter-Gatherers*, A. Montet-White and S. Holen, editors. University of Kansas Publications in Anthropology 19, Lawrence, Kan.


Hofman, Jack L., Lawrence C. Todd, C. Bertrand Schultz, and William Hendy 1991 The Lipscomb Bison Quarry: Continuing Investigation at a Folsom Site on the Southern Plains. *Bulletin of the Texas Archaeological Society* 60:149-189.

## ON Oldest Cloth

Fowler, Brenda 1995 Find Suggests Weaving Preceded Settled Life. *The New York Times*. May 9:B7-8. 

such depths, divers must breathe mixed gas and can stay down only a short time. Curiously, the pool's greatest depth is at the sides of its limestone shaft; a cone of sediments rises in the center with a peak that is about 124 feet below the surface. Warm spring water wells up from depths at the base of the cone, which apparently represents the accumulation of everything that has fallen into the spring for thousands of years. Though archaeologists have sampled the material of the cone, much remains to be discovered below the two-acre surface of the pool, whether on ledges visited by people and Pleistocene mammals, or at the bottom.

Threats of development reported more than a year ago (*Mammoth Trumpet* 9:1 "Warm Mineral Springs Site Under Threat") continue. McDonald noted that not only do plans call for a hotel, apartments and a shopping center in the general vicinity, one developer has proposed to inject sewage into the ground not far away. Any decrease in the spring's water quality presumably would threaten preservation and discovery of archaeological and paleontological materials the site holds.

Before being at Hagerman Fossil Beds, McDonald was curator of vertebrate paleontology at the Cincinnati Museum of Natural History, and he has been associated with museum collections in Idaho, Ontario, and Florida. 

-DAH

## Two Worldviews

*continued from page 3*

non-living entities. Unacknowledged are the enduring relationships that traditional Native Americans maintain with their ancestors and their world.

I have come to realize that the staffs of most museums and agencies do not share our basic values and our philosophical views. Museums certainly have had a great impact on traditional Native Americans and our perceptions of who we are. But we do not share the assumptions underlying what museums do: collection, preservation, documentation, and exhibition.

This difference in view surfaces in most of the activities surrounding NAGPRA. Encouragingly, this has led to a growing awareness among all those with a stake in repatriation.

Nowhere is this more apparent than at meetings of the committee. From the very first one—when six members were asked to nominate a seventh—decisions have been by consensus. This is the way of my people and the one with which I am most comfortable. The meetings are most often like open discussions than

formal get-togethers. Decisions are made only after all members, as well as the public, get a chance to air their views. Thus far, all of our decisions have been unanimous.

When the committee held hearings in Hawaii on the remains of Pacific islanders, member Dr. Martin Sullivan, head of the Heard Museum, asked Indians in the group to talk about accepting spiritual testimony. Dr. Sullivan was sincerely trying to understand how we should assess this evidence.

During our Phoenix meeting last year, there was animated discussion in which the public questioned the validity of scientific study. Leigh Jenkins, cultural preservation officer for the Hopi, stood up and in a gentle but certain voice talked about how his program works with the archaeological community to clarify issues about the past.

NAGPRA has brought together two completely different worldviews in a forum where people freely discuss their differences. This relationship, like any human relationship, is sometimes awkward, sometimes caring, and sometimes difficult. But it is a relationship that will continue.

-Tessie Naranjo